



Regulatory Test Report

Prepared for Harman Becker Automotive Systems

This report presents detailed information on

CY20 DA LOWER

Prepared by

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Engineer II

Approved by

Jason Kanakry

General Manager

Issue date: 06/03/2022

Report No: AH22021401-HAR-004-TR3 v3

This test result relates only to the described test object.

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Customer must not use this test report as the product certification of each accreditation body or each national organization.

The test is traceable to national standard or related international standard

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- **Test Request Information**

Test Request #:	7700119407
Test Requested By:	Mark Bowman Harman International Industries, Inc. 30001 Cabot Drive, Novi, MI 48377
Test item Description:	CY20 DA LOWER
Part Number:	T246
DUT Sample Number:	AH22021401-HAR-004#2, AH22021401-HAR-004#3
Hardware Version of DUT:	PV1
Software Version of DUT:	1.22.010
Component Category of DUT:	N/A
FCC ID:	2AHPN-BE2865
Type of Test:	FCC/ISED Certification
Test Method:	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2, ISED Canada RSS-Gen Issue 5 and ANSI C63.10-2013
Deviations from standard:	None
Approved Test Plan Number:	N/A
Test Plan Revision:	N/A
Date test sample received:	02-14-2022
Date test started:	03-09-2022
Date test finished:	05-27-2022

- **Test Laboratory Information**

Location of Test Lab:	The radiated and conducted emissions test sites are located at Bureau Veritas 815 N. Opdyke Rd #100, Auburn Hills, MI 48326, Phone: +1-248-836-4700
Key Contact:	Jason Kanakry (General Manager) Jason.Kanakry@BureauVeritas.com Phone: +1-248-836-4747
Laboratory Accreditations:	BUREAU VERITAS CONSUMER PRODUCTS SERVICES, INC is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
ISO/IEC 17025:2017:	5678.01
FCC Test Site Number:	US1278 (242530)
IC Test Site Number:	US0229 (26240)

• Statement of Conformity

RSS-GEN	RSS 247	Part 15	Comments
6.4		15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
		15.19	The label is shown in the label exhibit.
		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
3.2		15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13.2		15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
6.13.1		15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
6.8		15.203	EUT employs integrated PCB antenna with 1.79dBi gain.
8.10		15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable
8.8		15.207	N/A. EUT is vehicle battery powered only.

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

• Conducted Testing

Test Summary

This test report supports an application for certification of a transmitter operating pursuant to:

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

The product is **CY20 DA LOWER**. It is a frequency hopping spread spectrum transmitter that operates in the 2402 – 2480 MHz frequency range.

Details	Description
Frequency Range (MHz)	2402 – 2480
Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79
Tested Channels	0,39,78
DUT Antenna Type	Integrated PCB antenna
DUT Antenna Gain	1.79dBi ☒ Provided by Customer ☐ Not Provided by Customer

We found that the product met the above requirements without modification.

Test samples were received in good condition.

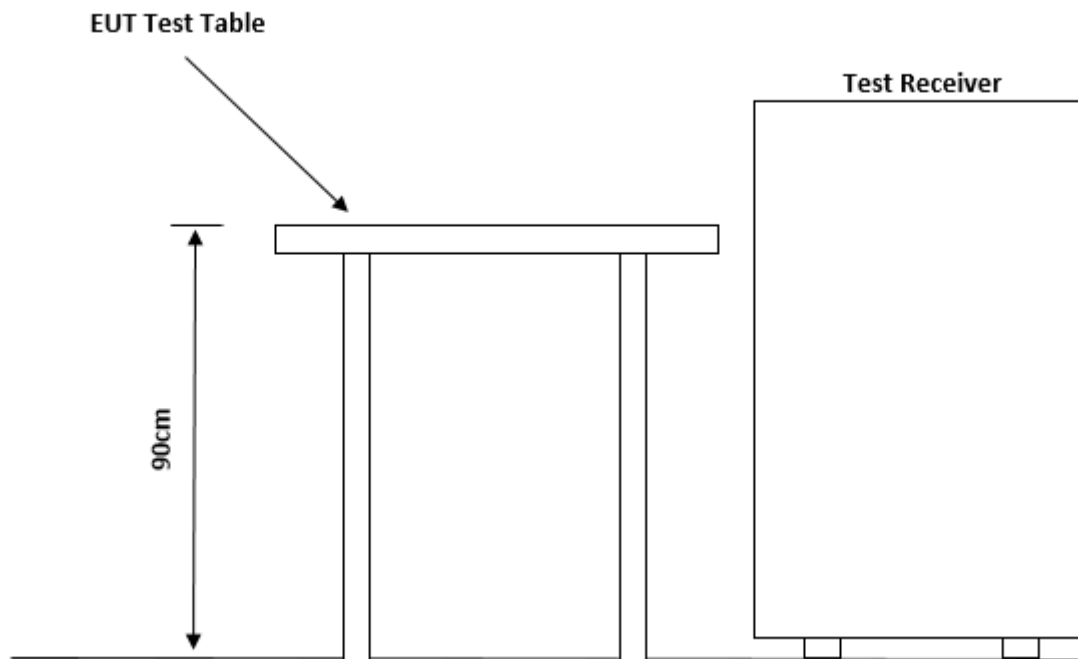
Test Item	Sample #	Result
FCC 15.247 Bluetooth Classic	AH22021401-HAR-004#2	Meets Requirement

Notes: 3-DH1 Packet type has highest emission, so full testing is performed with 3-DH1 Packet Type

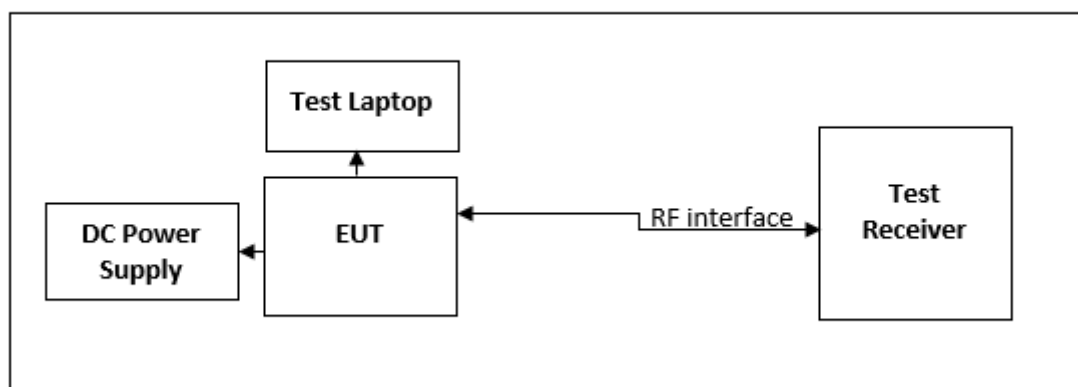
Test Setup

Conducted Test Site Description

The site is accommodated to test tabletop and floor standing test equipment.



TEST SETUP DIAGRAM



Test Equipment Used

ID #	Equipment	Manufacturer	Model #	Serial #	Cal Due
BVD0226	Spectrum Analyzer 10Hz-44GHz	Rohde & Schwarz	FSV3044	101018	01/14/2023
BVD0227	8 port switch unit for Wireless Test system	Rohde & Schwarz	OSP150	101100	12/17/2022
BVD0228	8 port switch unit for Wireless Test system	Rohde & Schwarz	OSP220	101632	12/16/2022
BVD0224	Signal Generator 100kHz-40GHz	Rohde & Schwarz	SMB100A	181741	11/19/2022
BVD0225	Signal Generator 100k-6GHz with GPS simulator	Rohde & Schwarz	SMW200A	107664	11/18/2022
BVD0250	Wireless Connectivity Tester 70M-6GHz	Rohde & Schwarz	CMW270	102113	11/18/2022
BVD0343	DC Regulated Power Supply	Circuit Specialists, INC	CSI3020X	595215	N/A
BVD0321	Fixed Attenuator 2W 20dB -40GHz	Mini-Circuits	BW-K20-2W44+	2103	03/21/2023
BVD0164	Multimeter	Fluke	287	46320236	03/06/2023
BVD0229	Temp and Humidity Meter	Fluke	971	12001009	05/01/2023
N/A	Test-PC	Lenovo ThinkPad	E560	PF0L0N9R	N/A

Notes:- DC power supply verified before use with calibrated Multimeter.

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	Cable Harness	Harman	N/A	N/A	N/A
N/A	USB Hub	Harman	N/A	3526408	N/A
N/A	USB 2.0 Ethernet Adapter	Trendnet	TU2-ET100	RA0JU56004466	V6.0R

Equipment List (Software)

ID #	Equipment	Manufacturer	Model	Version No.	
N/A	EMC Test Software	Rodhe & Schwarz	EMC32	11.20.00	N/A

FCC 15.247 Bluetooth Classic

DUT Information

DUT Name:	CY20 DA LOWER
Manufacturer:	Harman Becker Automotive Systems
Serial Number:	AH22021401-HAR-004#2

79 channels are provided for BT mode:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

Notes: The channels 0, 39 and 78 were selected as representative test channels.

Highest emissions are found with 3-DH1, So full testing is performed on 3-DH1

Antenna gain	1.79dBi ☒ Provided by Customer ☐ Not Provided by Customer
Number of transmit chains	1
Equipment type	Frequency Hopping Spread Spectrum
Dwell Time	650μs

Test Results Summary

Test	Frequency (MHz)	DH1 Result	DH3 Result	DH5 Result	2-DH1 Result	2-DH3 Result	2-DH5 Result	3-DH1 Result	3-DH3 Result	3-DH5 Result
RF Output Power	--- (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Hopping Frequencies	--- (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Band Edge High	--- (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Carrier Frequency Separation	2402.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Carrier Frequency Separation	2480.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Time of Channel Occupancy	2402.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Time of Channel Occupancy	2441.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Time of Channel Occupancy	2480.000 (hopping)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Emissions Bandwidth 20dB	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Occupied Channel Bandwidth 99%	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Band Edge Low	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peak Output Power	2402.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Tx Spurious	2402.000 (single)	Pass	--	--	--	--	--	Pass	--	--
Emissions Bandwidth 20dB	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Occupied Channel Bandwidth 99%	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peak Output Power	2441.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Tx Spurious	2441.000 (single)	Pass	--	--	--	--	--	Pass	--	--
Emissions Bandwidth 20dB	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Occupied Channel Bandwidth 99%	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Band Edge High	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Peak Output Power	2480.000 (single)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Tx Spurious	2480.000 (single)	Pass	--	--	--	--	--	Pass	--	--

RF Output Power (Frequency Independent) – Reference Only

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.9.2.3.2.

Not mandatory.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Combined Uncertainty of absolute Level Measurement ($K=2$) < 1 dB

All Power measurements performed in hopping mode.

Packet Type	Duty Cycle, %	Gated RMS (dBm)	Limit Max (dBm)
DH1	31.122	1.481	21.0
DH3	65.800	1.528	21.0
DH5	77.148	1.533	21.0
2-DH1	31.312	1.848	21.0
2-DH3	65.736	1.838	21.0
2-DH5	77.103	1.830	21.0
3-DH1	31.246	1.851	21.0
3-DH3	65.654	1.834	21.0
3-DH5	77.116	1.820	21.0

Number of Hopping Frequencies

Test according to FCC title 47 part 15 §15.247(a),(g), KDB 558074 D01 DTS Meas Guidance v05 9 and ANSI C63.10-2013 7.8.3

Channels

Channels	Limit Min	Result
79	15	PASS

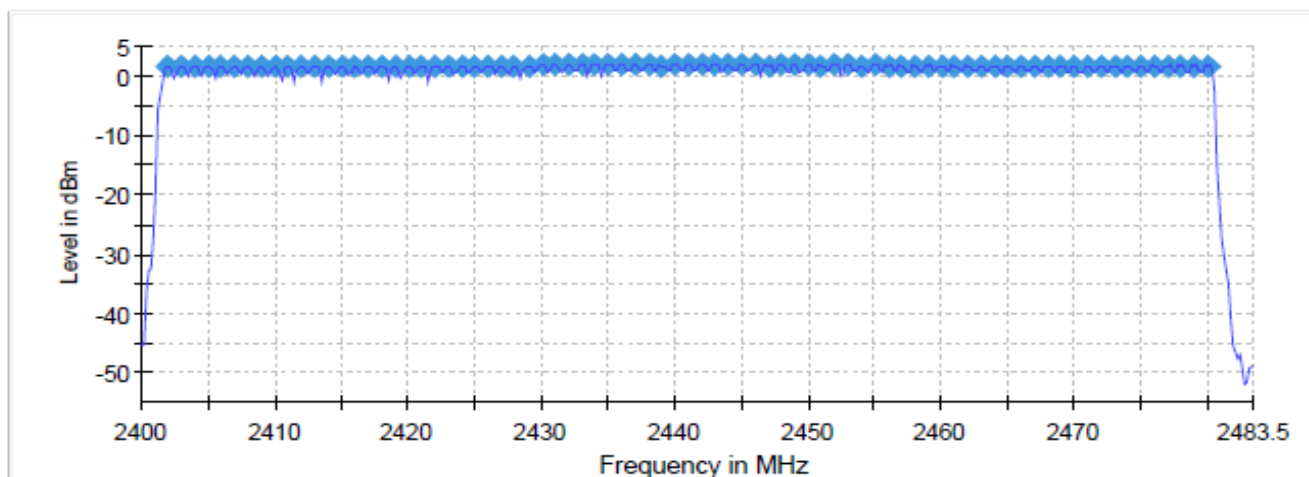
Spectrum Analyzer Settings

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	200.000 kHz	<= 200.000 kHz
VBW	200.000 kHz	>= 200.000 kHz
SweepPoints	418	~ 418
Sweeptime	200.000 ms	200.000 ms
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 10	max. 10
Stable	1 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Plots for **3-DH1** packet type shown below.

Hopping Frequencies

Sequence



Band Edge (Hopping)

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.6

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

Data Rate	Frequency (MHz)	Level (dBm)
DH1-LCH	2397.587000	-1.6
DH1-HCH	2484.372400	-1.2
3-DH1	2429.825000	3.5

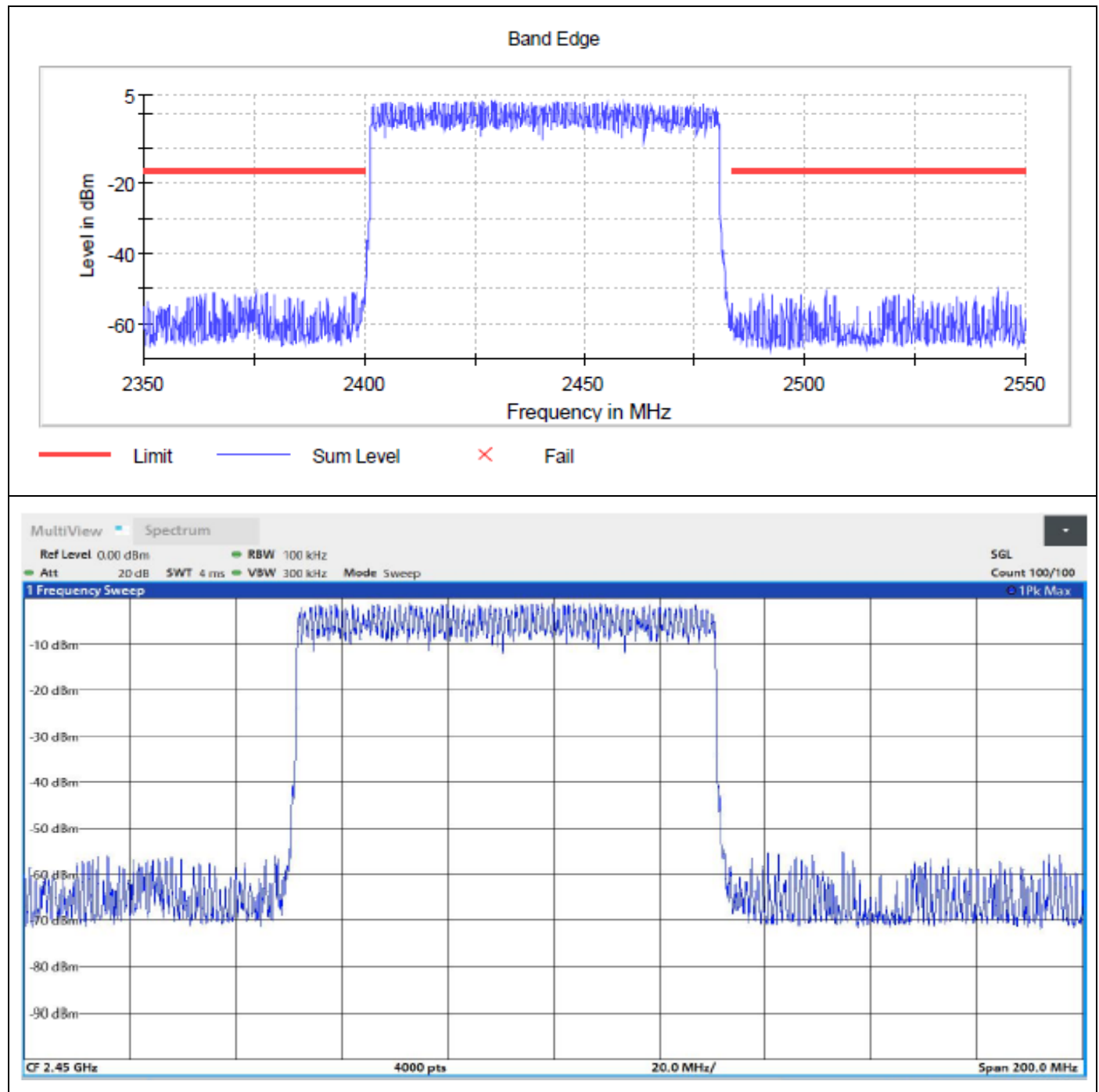
Measurements for 3-DH1 Packet Type

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2504.675000	-50.1	33.6	-16.5	PASS
2504.725000	-50.4	33.9	-16.5	PASS
2543.725000	-50.8	34.3	-16.5	PASS
2545.775000	-50.9	34.4	-16.5	PASS
2543.675000	-51.0	34.5	-16.5	PASS
2504.625000	-51.1	34.5	-16.5	PASS
2397.425000	-51.2	34.7	-16.5	PASS
2490.575000	-51.2	34.7	-16.5	PASS
2397.475000	-51.2	34.7	-16.5	PASS
2365.775000	-51.2	34.7	-16.5	PASS
2365.825000	-51.2	34.7	-16.5	PASS
2490.525000	-51.3	34.8	-16.5	PASS
2363.825000	-51.3	34.8	-16.5	PASS
2377.725000	-51.4	34.9	-16.5	PASS
2545.825000	-51.5	35.0	-16.5	PASS

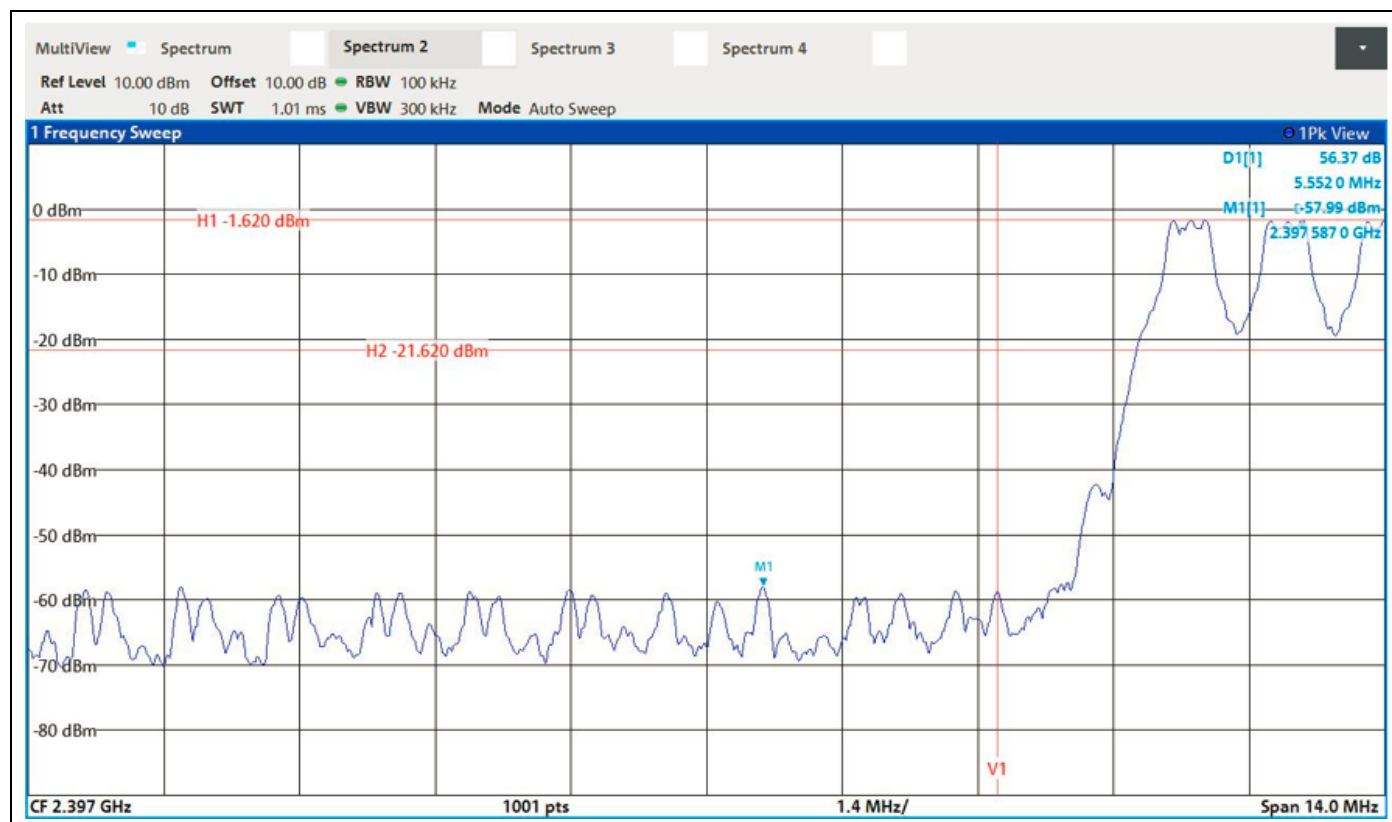
Spectrum Analyzer Settings for 3-DH1 Packet Type

Setting	Instrument Value	Target Value
Start Frequency	2.35000 GHz	2.35000 GHz
Stop Frequency	2.55000 GHz	2.55000 GHz
Span	200.000 MHz	200.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	4000	~ 4000
SweepTime	4.000 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	50 / max. 50	max. 50
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

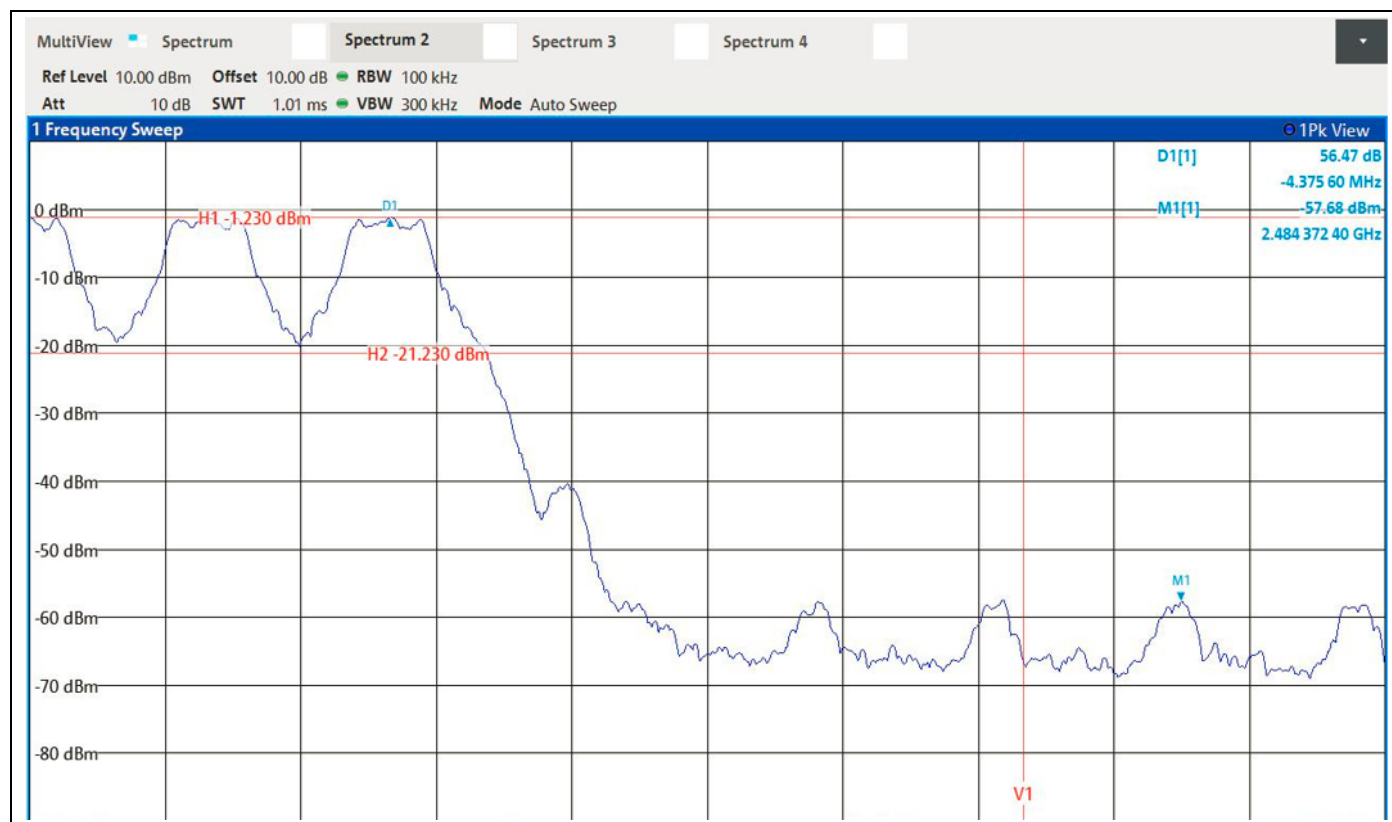
Plots for **3-DH1** packet type shown below



Plots for DH1 BE LCH Shown below



Plots for DH1 BE HCH Shown below



Carrier Frequency Separation

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 9 and ANSI C63.10-2013 7.8.2

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty ($k = 2$) $< 1\%$

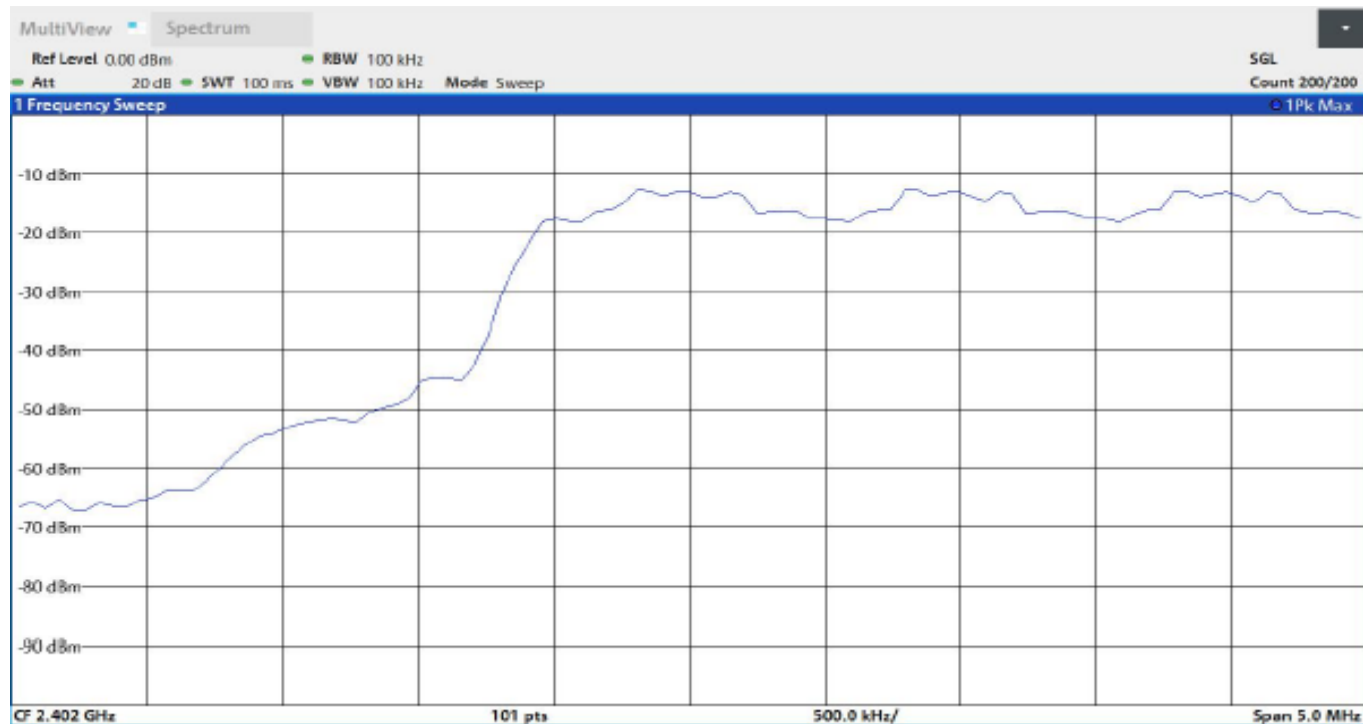
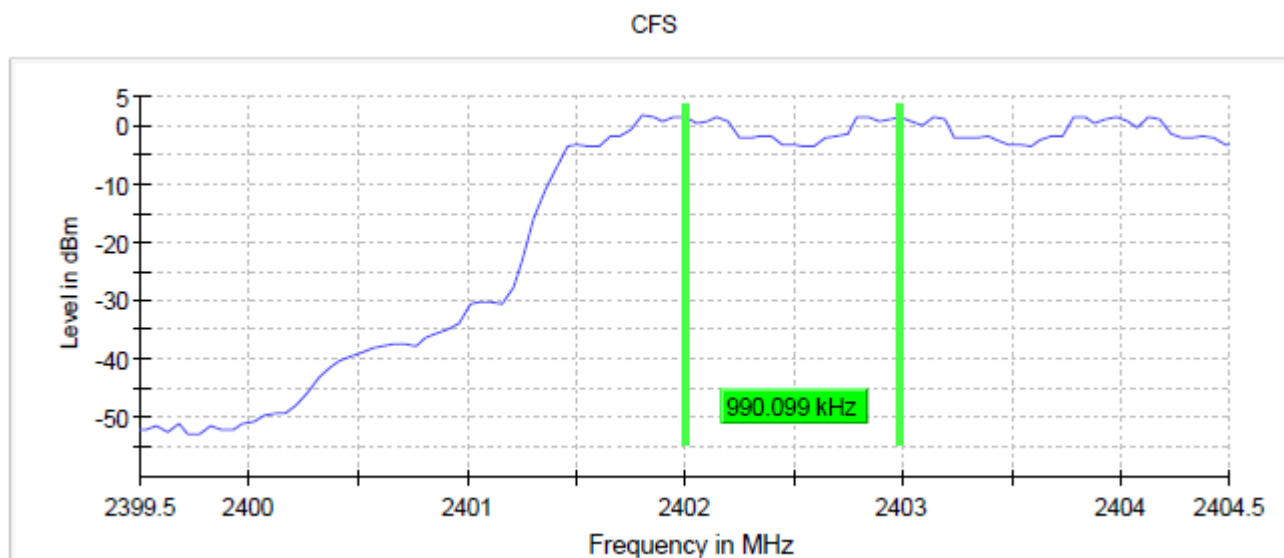
Hopping Mode				
Packet Type	2402MHz		2480MHz	
	Frequency Separation (MHz)	Minimum Limit (MHz)	Frequency Separation (MHz)	Minimum Limit (MHz)
3-DH1	0.990099	0.666667	0.990099	0.666667

Spectrum Analyzer Settings for 3-DH1 Packet Type

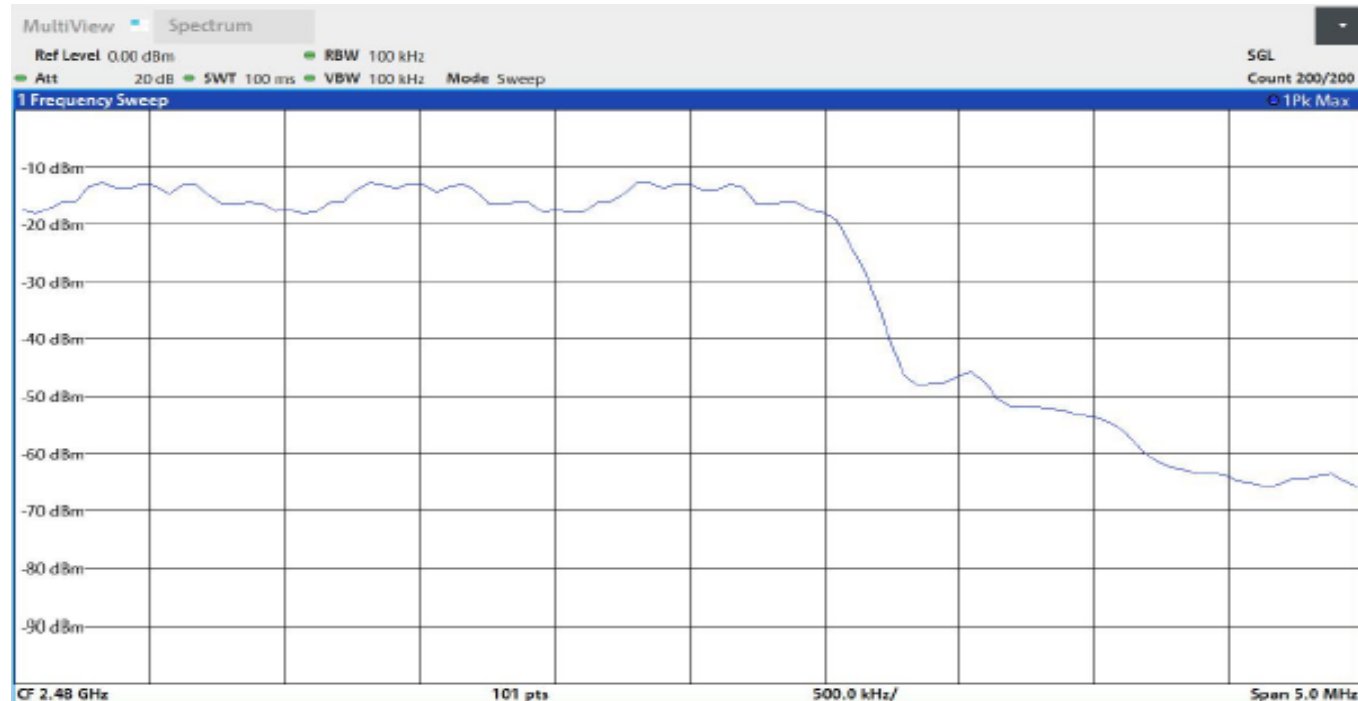
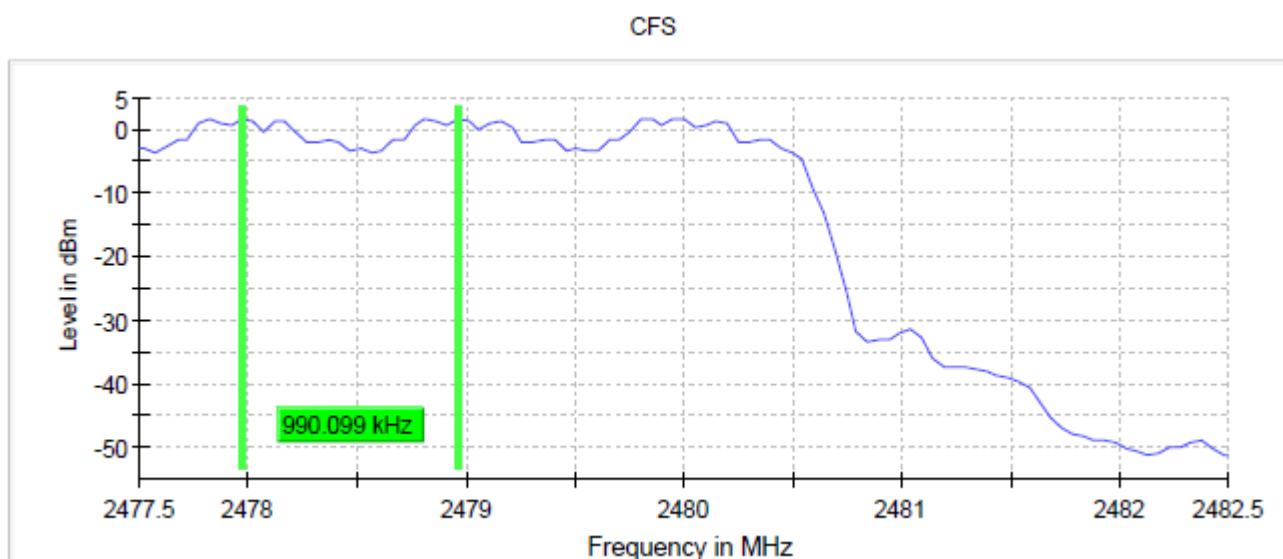
Setting	Instrument Value	Target Value
Start Frequency	2.39950 GHz	2.39950 GHz
Stop Frequency	2.40450 GHz	2.40450 GHz
Span	5.000 MHz	5.000 MHz
RBW	100.000 kHz	≤ 100.000 kHz
VBW	100.000 kHz	≥ 100.000 kHz
SweepPoints	101	~ 50
SweepTime	100.000 ms	100.000 ms
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	FFT
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	18 / max. 50	max. 50
Stable	10 / 10	10
Max Stable Difference	0.11 dB	0.50 dB

Plots for **3-DH1** packet type shown below

2402MHz 3-DH1



2480MHz 3-DH1



Time of Channel Occupancy

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.4

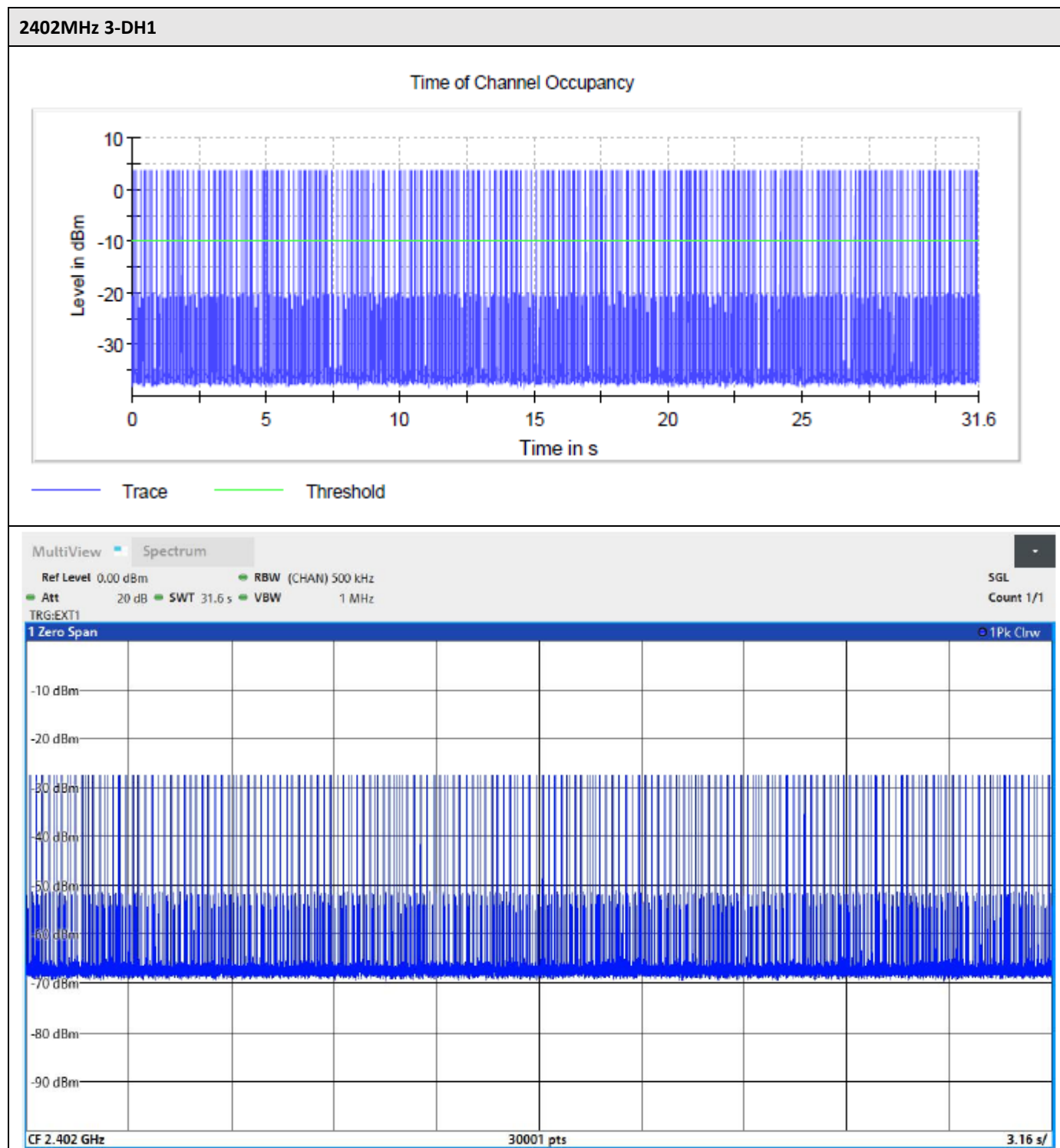
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1%

Frequency	Data Rate	Time (ms)	Limit Max (ms)	Result
2402	3-DH1	126.720	400.000	PASS
2402	3-DH5	329.200	400.000	PASS
2441	3-DH1	126.740	400.000	PASS
2441	3-DH5	288.890	400.000	PASS
2480	3-DH1	126.430	400.000	PASS
2480	3-DH5	285.640	400.000	PASS

Spectrum Analyzer Settings for 2402MHz

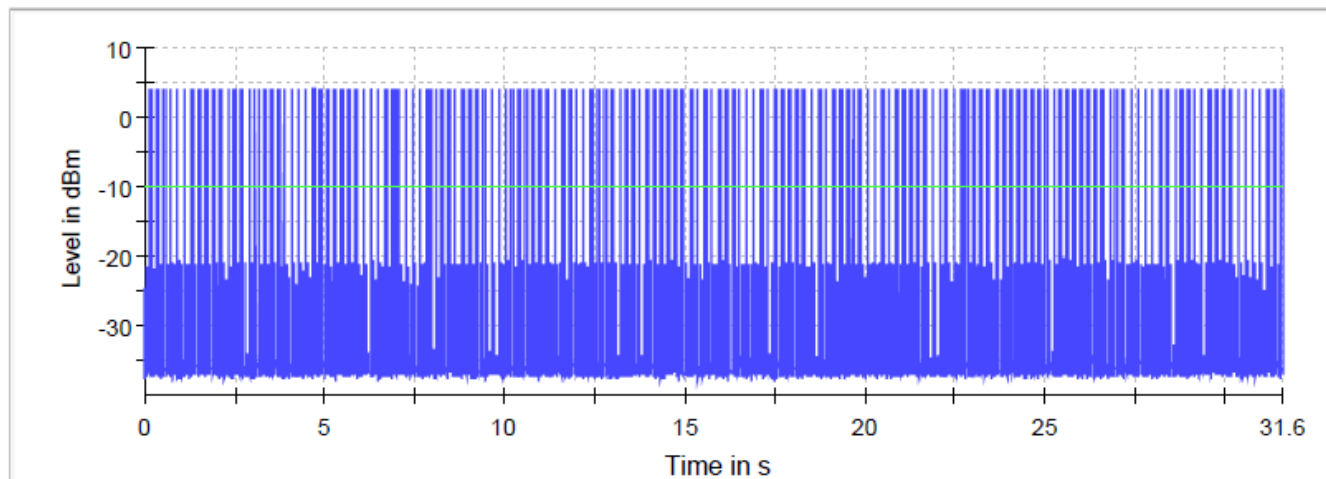
Setting	Instrument Value	Target Value
Center Frequency	2.40200 GHz	2.40200 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 500.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
SweepTime	31.600 s	31.600 s
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
SweepType	Sweep	AUTO
Preamplifier	off	off
Trigger	External	External
Trigger Offset	0.000 s	0.000 s

Plots for **3-DH1** packet type shown below



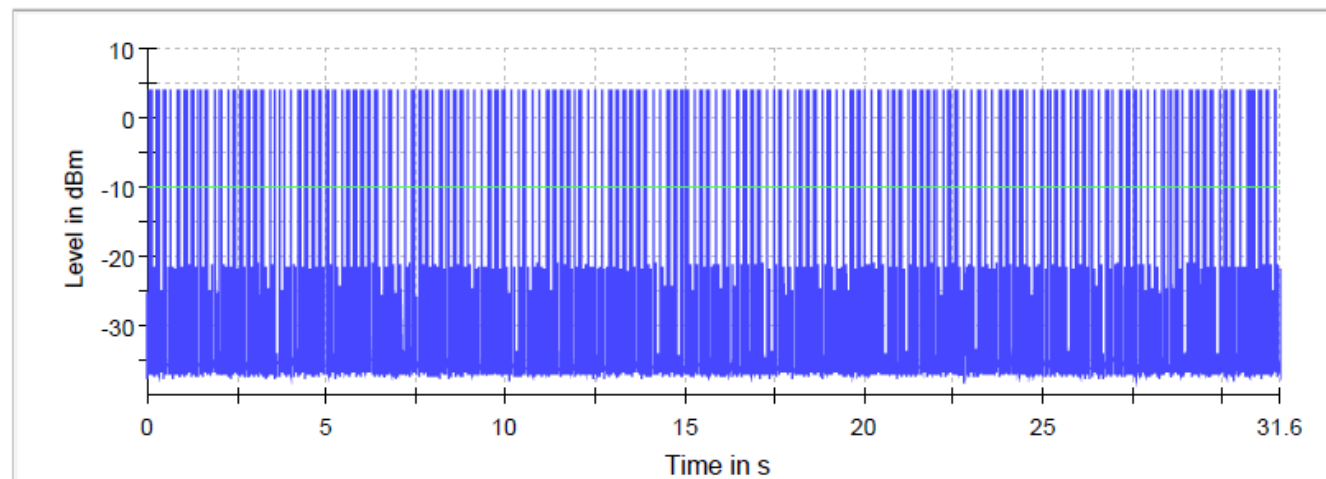
2441MHz 3-DH1

Time of Channel Occupancy



2480MHz 3-DH1

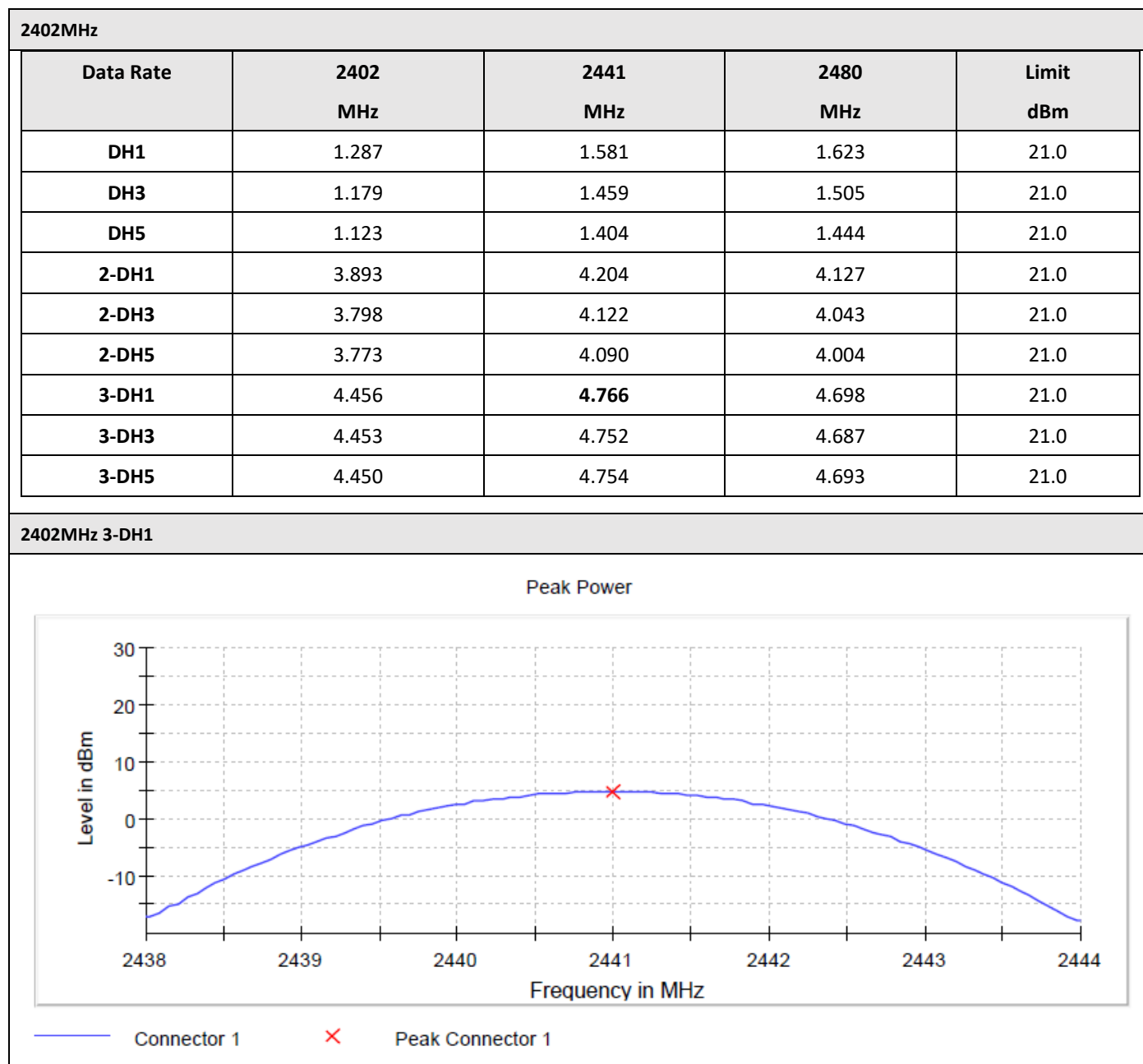
Time of Channel Occupancy

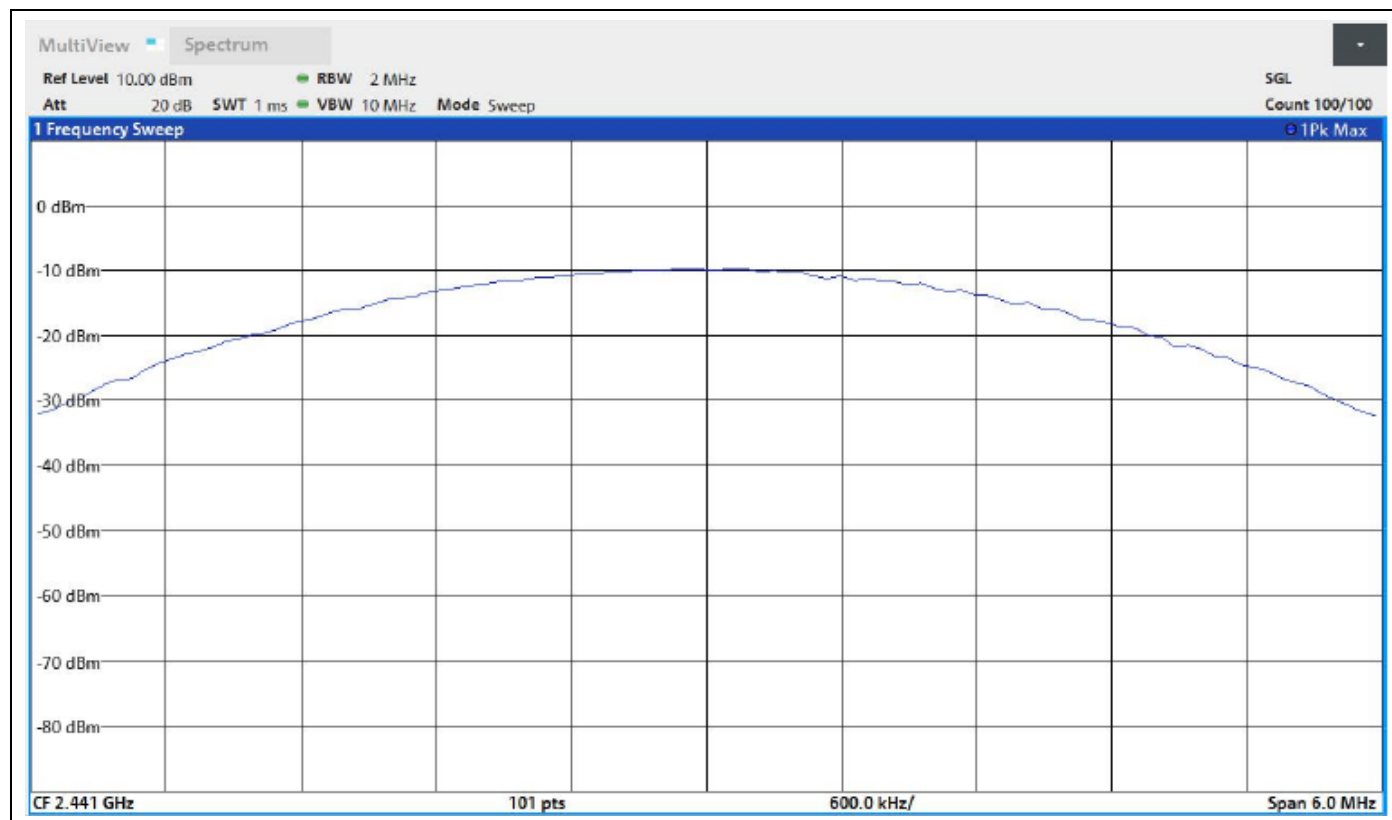


Peak Output Power

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.5

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Combined Uncertainty of absolute Level Measurement ($K=2$) < 1 dB





Emission Bandwidth 20dB

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.7

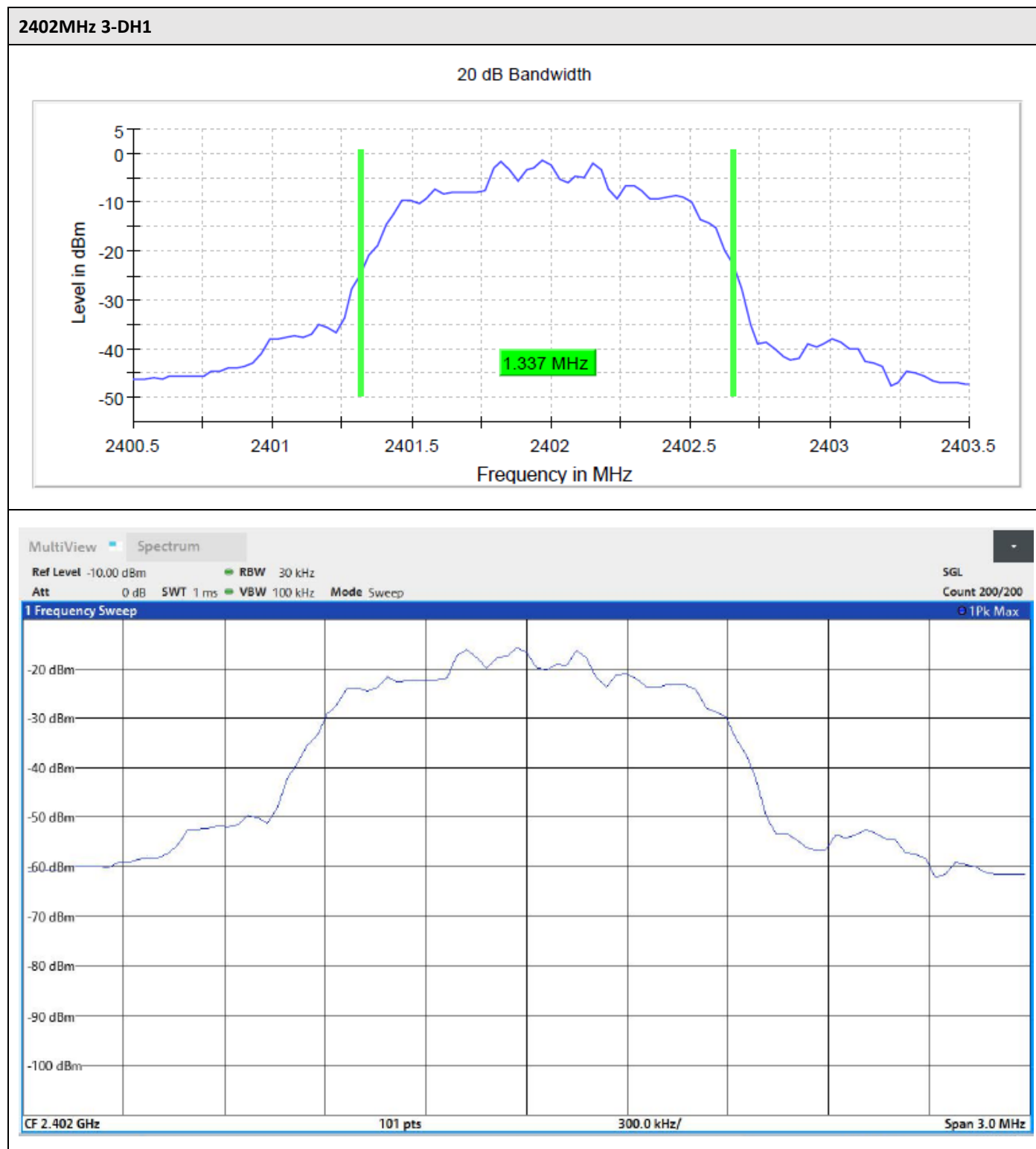
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

Channel / Frequency (MHz)	Packet Type	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
0 / 2402	DH1	1.009900	2401.495050	2402.504950	PASS
	DH3	1.009900	2401.495050	2402.504950	PASS
	DH5	1.009900	2401.495050	2402.504950	PASS
	2-DH1	1.366336	2401.287129	2402.653465	PASS
	2-DH3	1.396039	2401.287129	2402.683168	PASS
	2-DH5	1.396039	2401.287129	2402.683168	PASS
	3-DH1	1.336633	2401.316832	2402.653465	PASS
	3-DH3	1.336633	2401.316832	2402.653465	PASS
	3-DH5	1.336633	2401.316832	2402.653465	PASS
39 / 2441	DH1	1.009900	2440.495050	2441.504950	PASS
	DH3	1.009900	2440.495050	2441.504950	PASS
	DH5	1.009900	2440.495050	2441.504950	PASS
	2-DH1	1.336633	2440.316832	2441.653465	PASS
	2-DH3	1.396039	2440.287129	2441.683168	PASS
	2-DH5	1.396039	2440.287129	2441.683168	PASS
	3-DH1	1.336633	2440.316832	2441.653465	PASS
	3-DH3	1.336633	2440.316832	2441.653465	PASS
	3-DH5	1.336633	2440.316832	2441.653465	PASS
78 / 2480	DH1	1.009900	2479.495050	2480.504950	PASS
	DH3	1.009900	2479.495050	2480.504950	PASS
	DH5	1.009900	2479.495050	2480.504950	PASS
	2-DH1	1.336633	2479.316832	2480.653465	PASS
	2-DH3	1.366336	2479.316832	2480.683168	PASS
	2-DH5	1.366336	2479.316832	2480.683168	PASS
	3-DH1	1.336633	2479.316832	2480.653465	PASS
	3-DH3	1.336633	2479.316832	2480.653465	PASS
	3-DH5	1.336633	2479.316832	2480.653465	PASS

Spectrum Analyzer Settings for 2402MHz

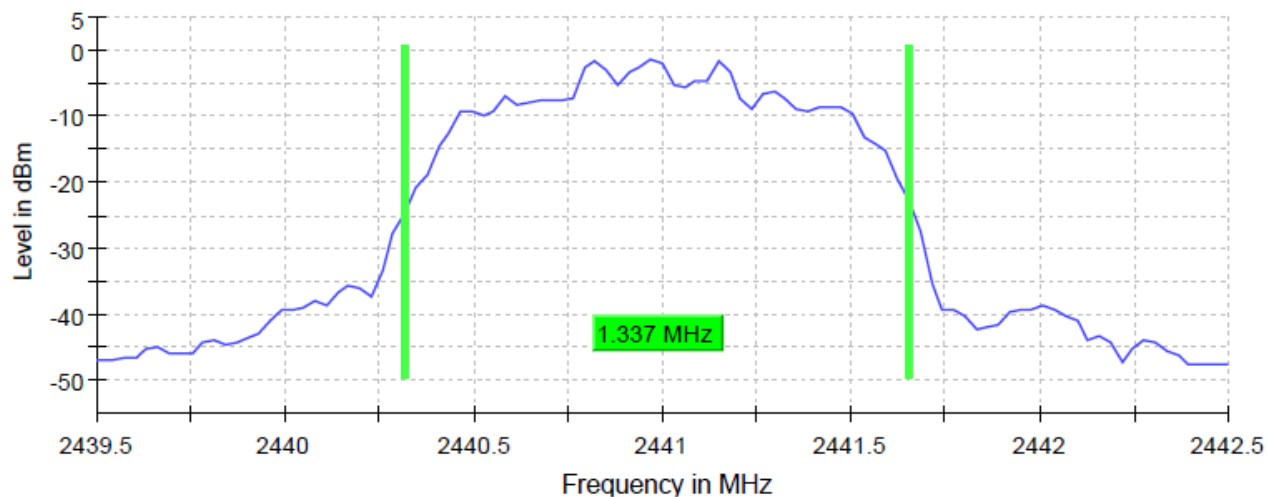
Setting	Instrument Value	Target Value
Start Frequency	2.40050 GHz	2.40050 GHz
Stop Frequency	2.40350 GHz	2.40350 GHz
Span	3.000 MHz	3.000 MHz
RBW	30.000 kHz	>= 30.000 kHz
VBW	100.000 kHz	>= 90.000 kHz
SweepPoints	101	~ 101
Sweeptime	1.000 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.06 dB	0.50 dB

Plots for **3-DH1** Packet Type shown below



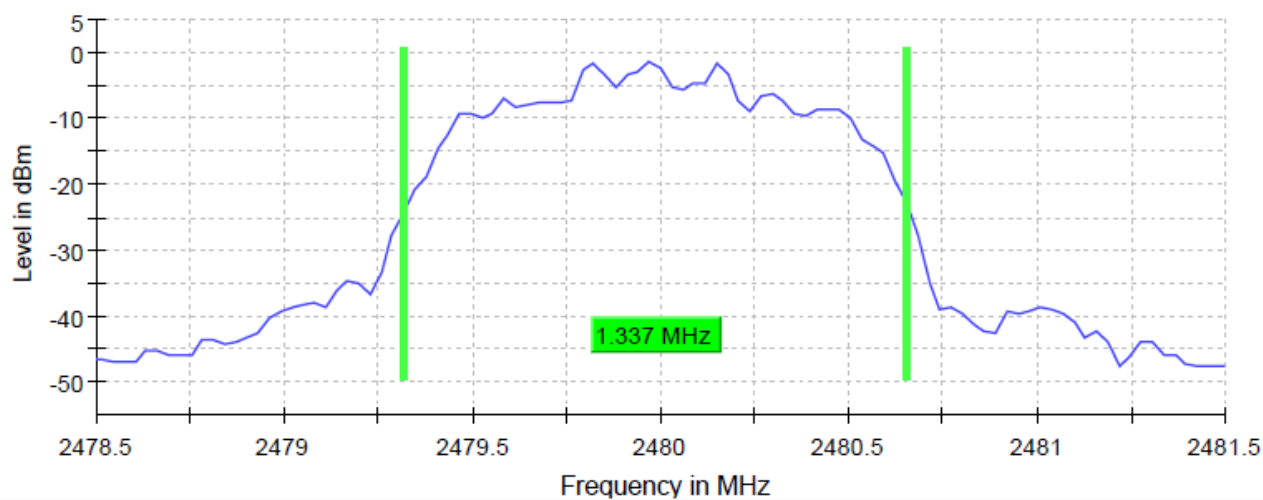
2441MHz 3-DH1

20 dB Bandwidth



2480MHz 3-DH1

20 dB Bandwidth



Occupied Channel Bandwidth 99%

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.7

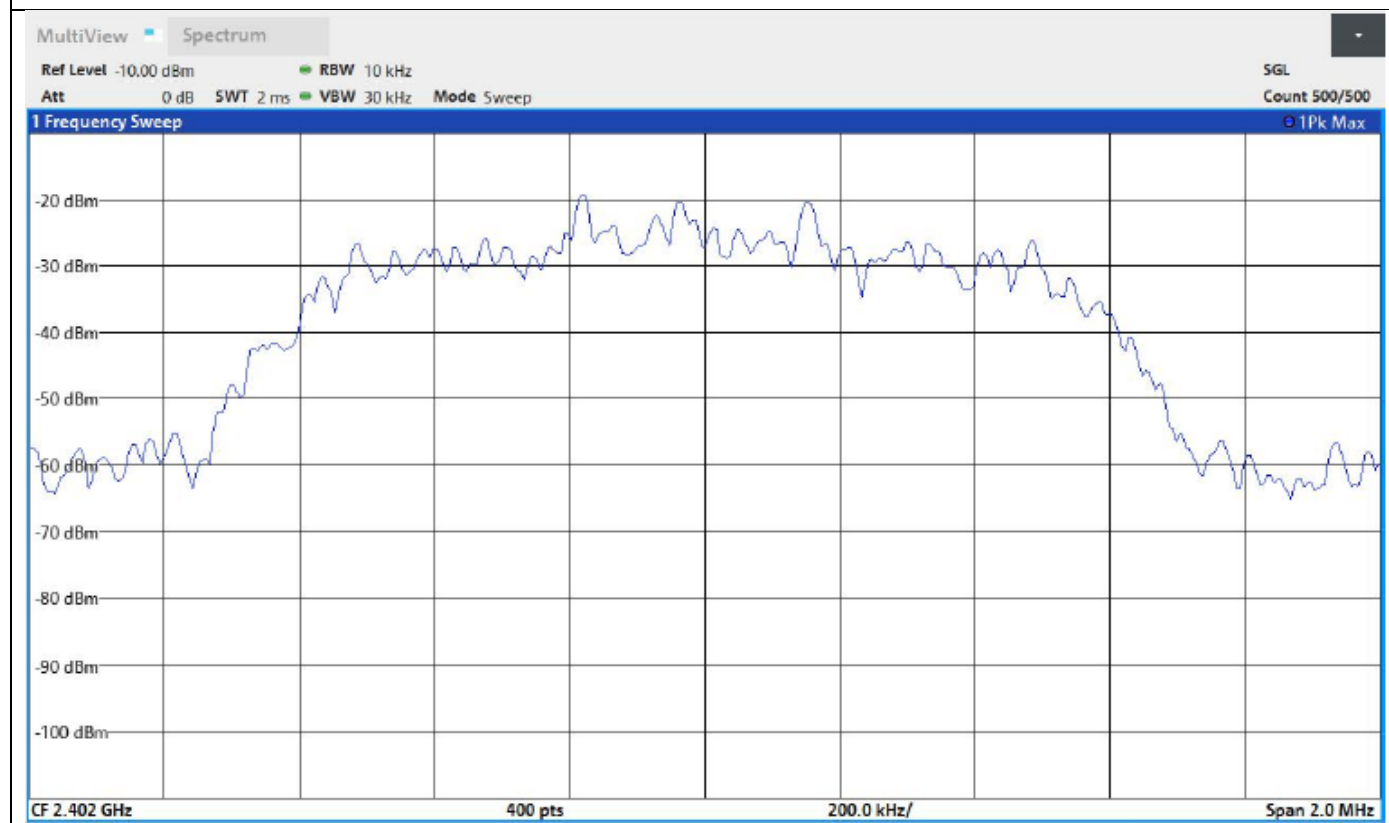
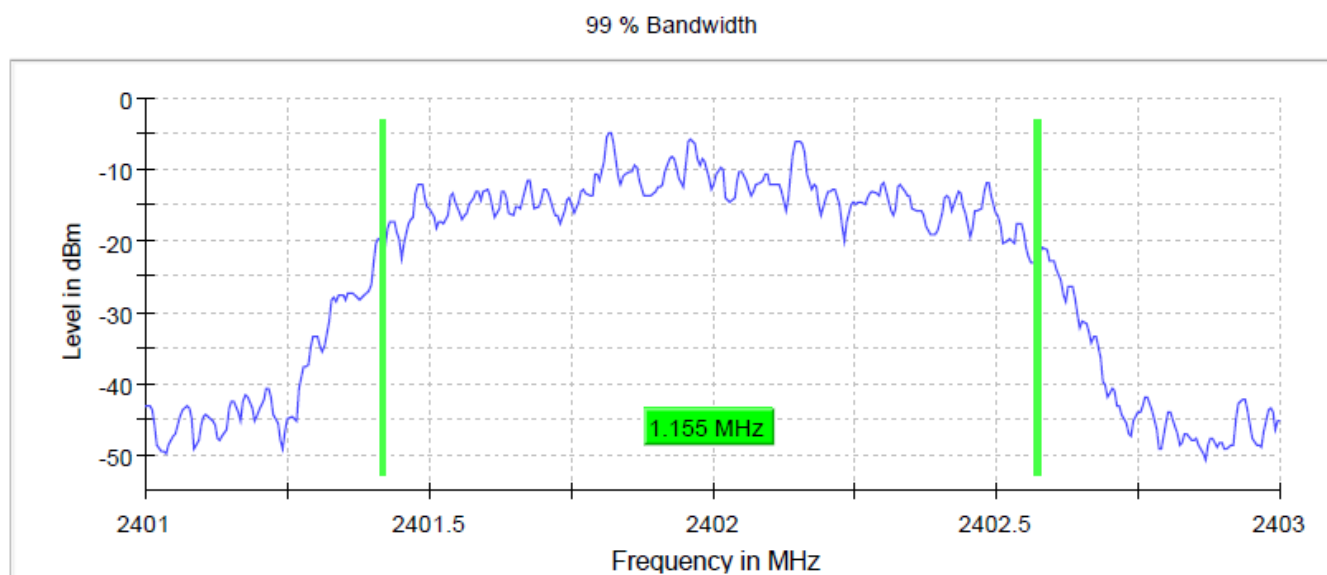
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

Channel / Frequency (MHz)	Packet Type	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
0 / 2402	DH1	0.845000	2401.572500	2402.417500	PASS
	DH3	0.855000	2401.557500	2402.412500	PASS
	DH5	0.860000	2401.557500	2402.417500	PASS
	2-DH1	1.145000	2401.412500	2402.557500	PASS
	2-DH3	1.170000	2401.402500	2402.572500	PASS
	2-DH5	1.160000	2401.407500	2402.567500	PASS
	3-DH1	1.155000	2401.417500	2402.572500	PASS
	3-DH3	1.170000	2401.402500	2402.572500	PASS
	3-DH5	1.170000	2401.402500	2402.572500	PASS
39 / 2441	DH1	0.845000	2440.572500	2441.417500	PASS
	DH3	0.860000	2440.557500	2441.417500	PASS
	DH5	0.860000	2440.557500	2441.417500	PASS
	2-DH1	1.145000	2440.412500	2441.557500	PASS
	2-DH3	1.170000	2440.402500	2441.572500	PASS
	2-DH5	1.160000	2440.407500	2441.567500	PASS
	3-DH1	1.150000	2440.422500	2441.572500	PASS
	3-DH3	1.170000	2440.402500	2441.572500	PASS
	3-DH5	1.165000	2440.402500	2441.567500	PASS
78 / 2480	DH1	0.845000	2479.572500	2480.417500	PASS
	DH3	0.850000	2479.562500	2480.412500	PASS
	DH5	0.855000	2479.557500	2480.412500	PASS
	2-DH1	1.145000	2479.412500	2480.557500	PASS
	2-DH3	1.170000	2479.402500	2480.572500	PASS
	2-DH5	1.160000	2479.407500	2480.567500	PASS
	3-DH1	1.155000	2479.417500	2480.572500	PASS
	3-DH3	1.165000	2479.402500	2480.567500	PASS
	3-DH5	1.165000	2479.402500	2480.567500	PASS

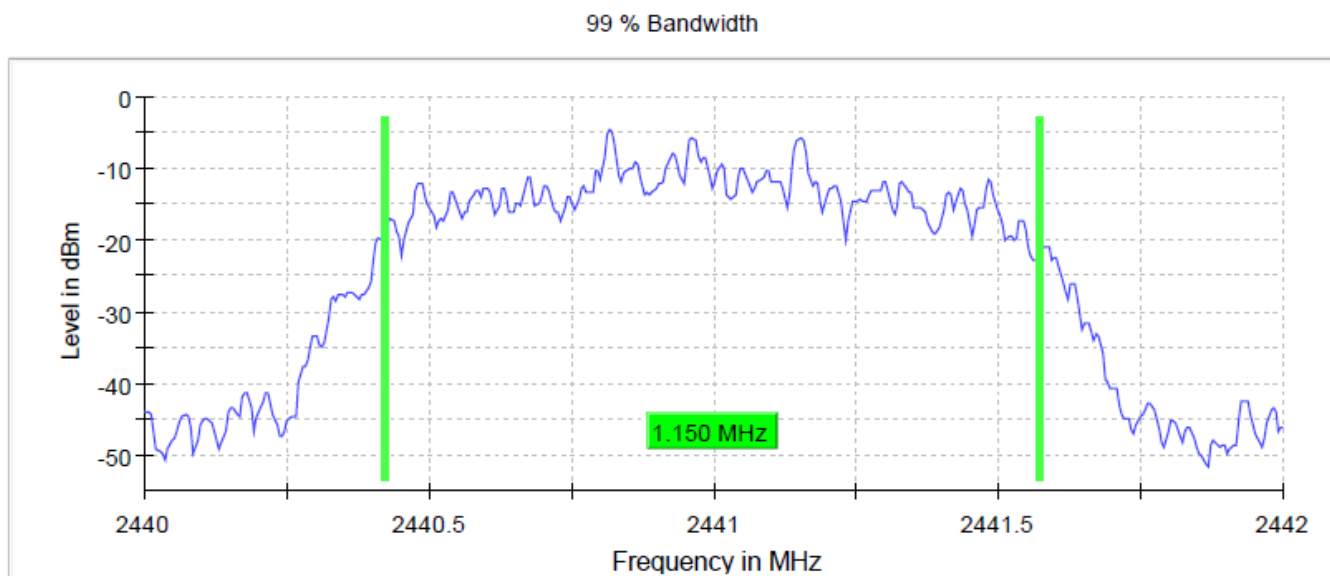
Spectrum Analyzer Settings for 2402MHz

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	>= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	400	~ 400
SweepTime	2.000 ms	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	0.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	500	500
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.07 dB	0.30 dB

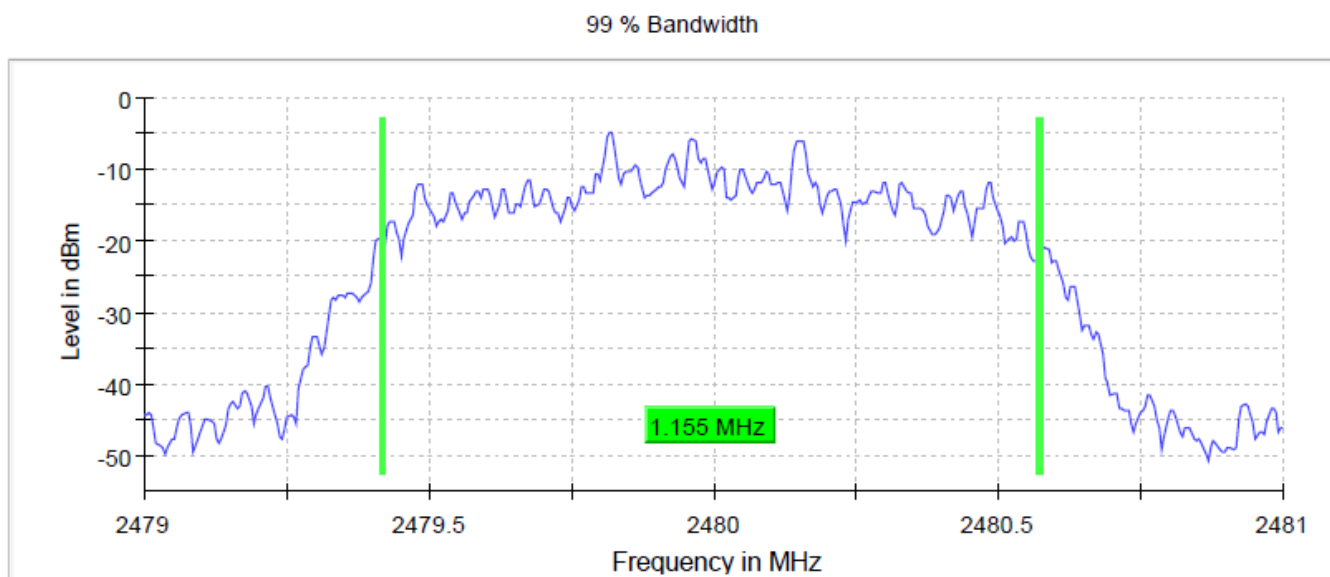
2402MHz 3-DH1



2441MHz 3-DH1



2480MHz 3-DH1



Band Edge Low (2402 MHz)

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.6

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

Data Rate	Frequency (MHz)	Level(dBm)
DH1	2399.658000	-1.6
3-DH1	2401.825000	3.3

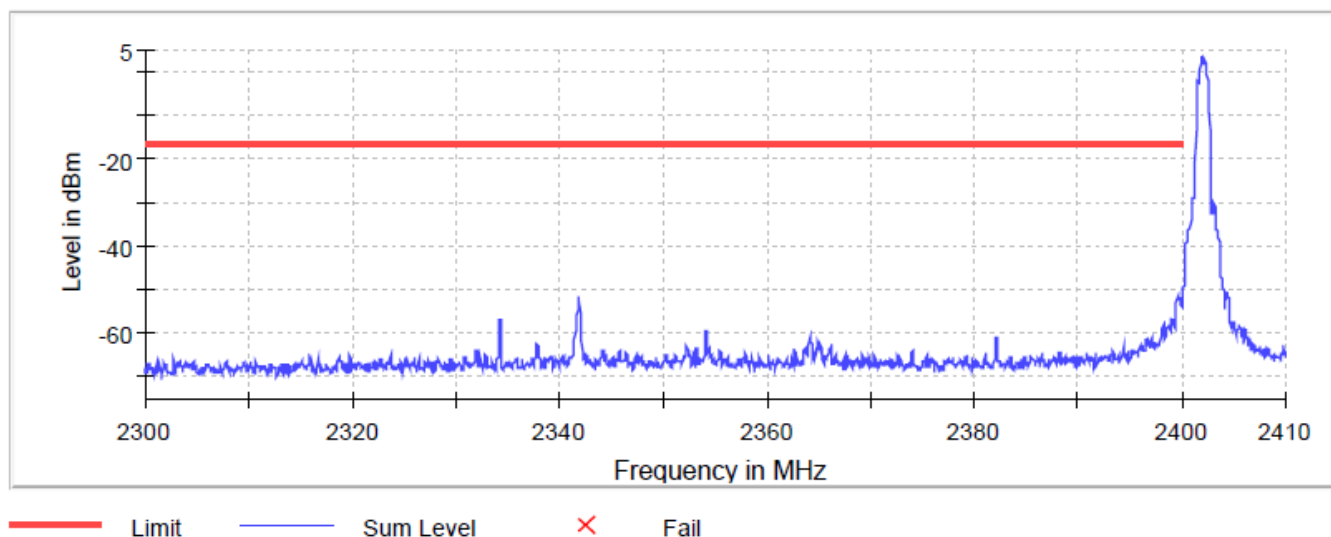
Spectrum Analyzer Settings

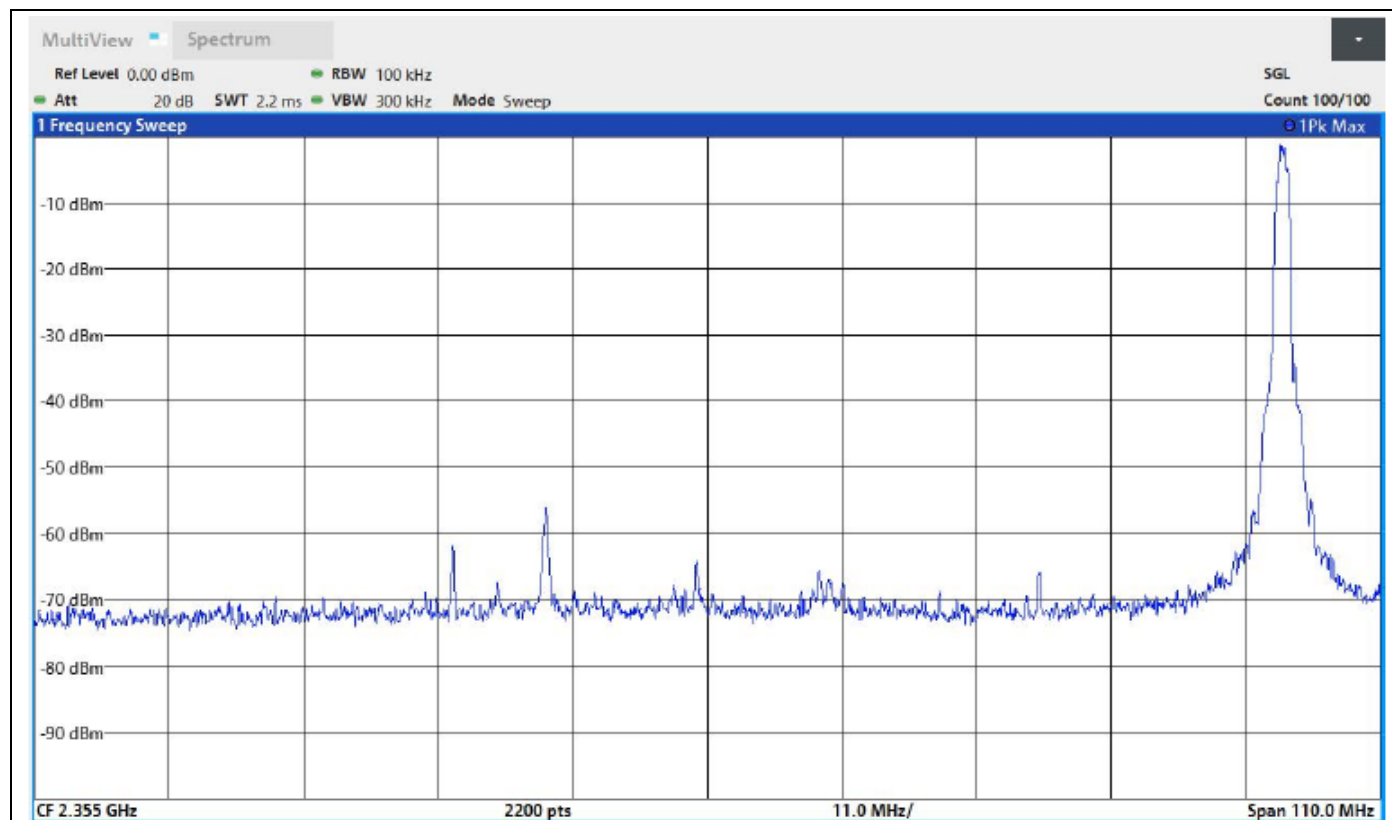
Setting	Instrument Value	Target Value
Start Frequency	2.30000 GHz	2.30000 GHz
Stop Frequency	2.41000 GHz	2.41000 GHz
Span	110.000 MHz	110.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	2200	~ 2200
SweepTime	2.200 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 30	max. 30
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

2402MHz 3-DH1

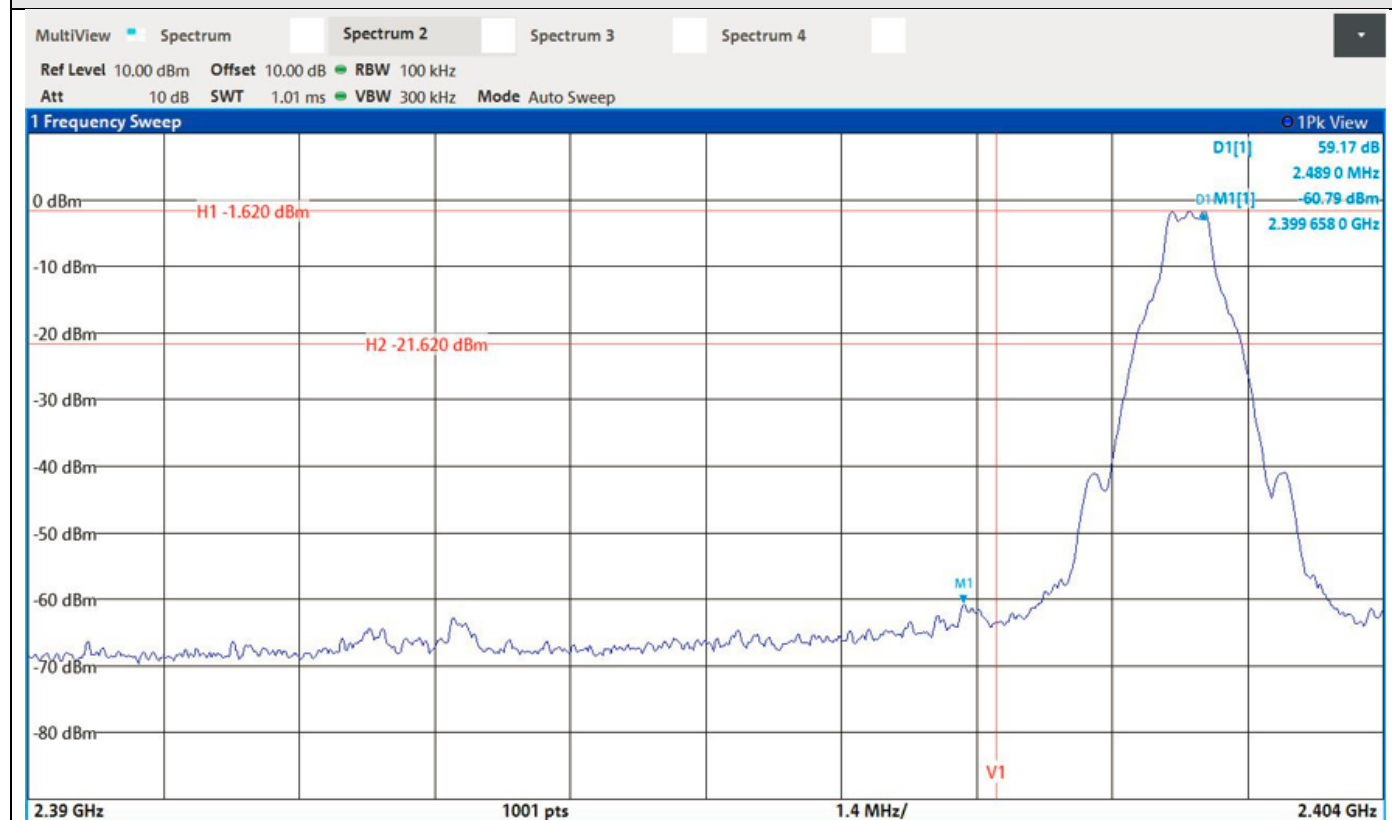
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2341.775000	-51.3	34.6	-16.7	PASS
2341.825000	-51.3	34.6	-16.7	PASS
2399.575000	-51.7	34.9	-16.7	PASS
2399.525000	-51.7	35.0	-16.7	PASS
2399.675000	-51.9	35.1	-16.7	PASS
2399.725000	-52.0	35.2	-16.7	PASS
2399.625000	-52.6	35.9	-16.7	PASS
2341.875000	-52.7	36.0	-16.7	PASS
2341.725000	-52.8	36.1	-16.7	PASS
2399.475000	-52.9	36.1	-16.7	PASS
2399.875000	-53.4	36.7	-16.7	PASS
2399.925000	-53.4	36.7	-16.7	PASS
2399.825000	-53.6	36.8	-16.7	PASS
2399.775000	-53.7	37.0	-16.7	PASS
2399.975000	-53.8	37.1	-16.7	PASS

Band Edge





2402MHz DH1



Band Edge High (2480 MHz)

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 7.8.6

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

Data Rate	Frequency (MHz)	Level(dBm)
DH1	2483.579200	-1.2
3-DH1	2479.825000	2.7

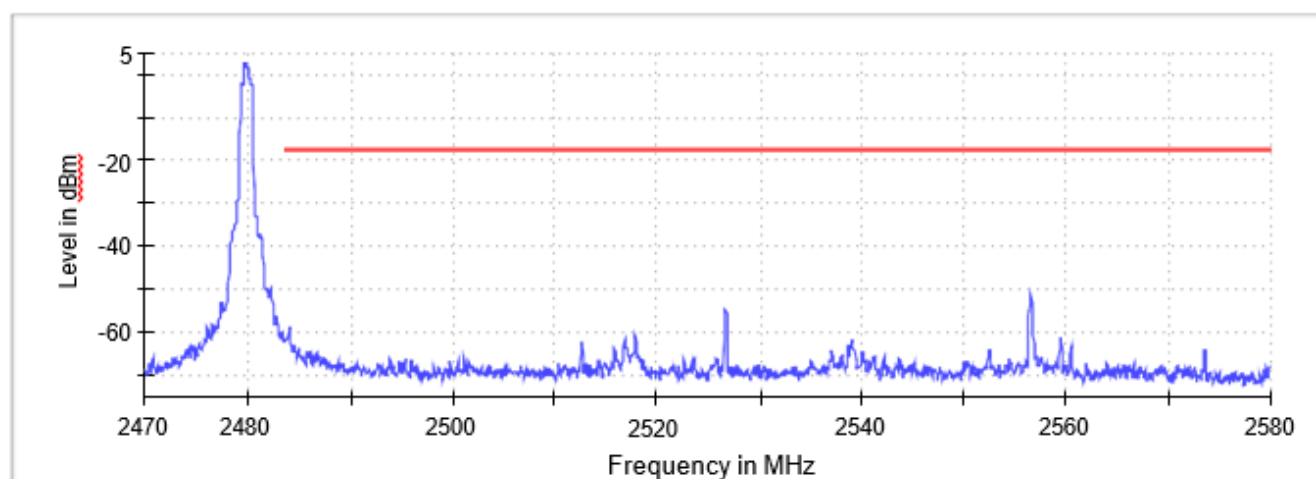
Spectrum Analyzer Settings

Setting	Instrument Value	Target Value
Start Frequency	2.47000 GHz	2.47000 GHz
Stop Frequency	2.58000 GHz	2.58000 GHz
Span	110.000 MHz	110.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	2200	~ 2200
SweepTime	2.200 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	10.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 30	max. 30
Stable	3 / 3	3
Max Stable Difference	0.18 dB	0.50 dB

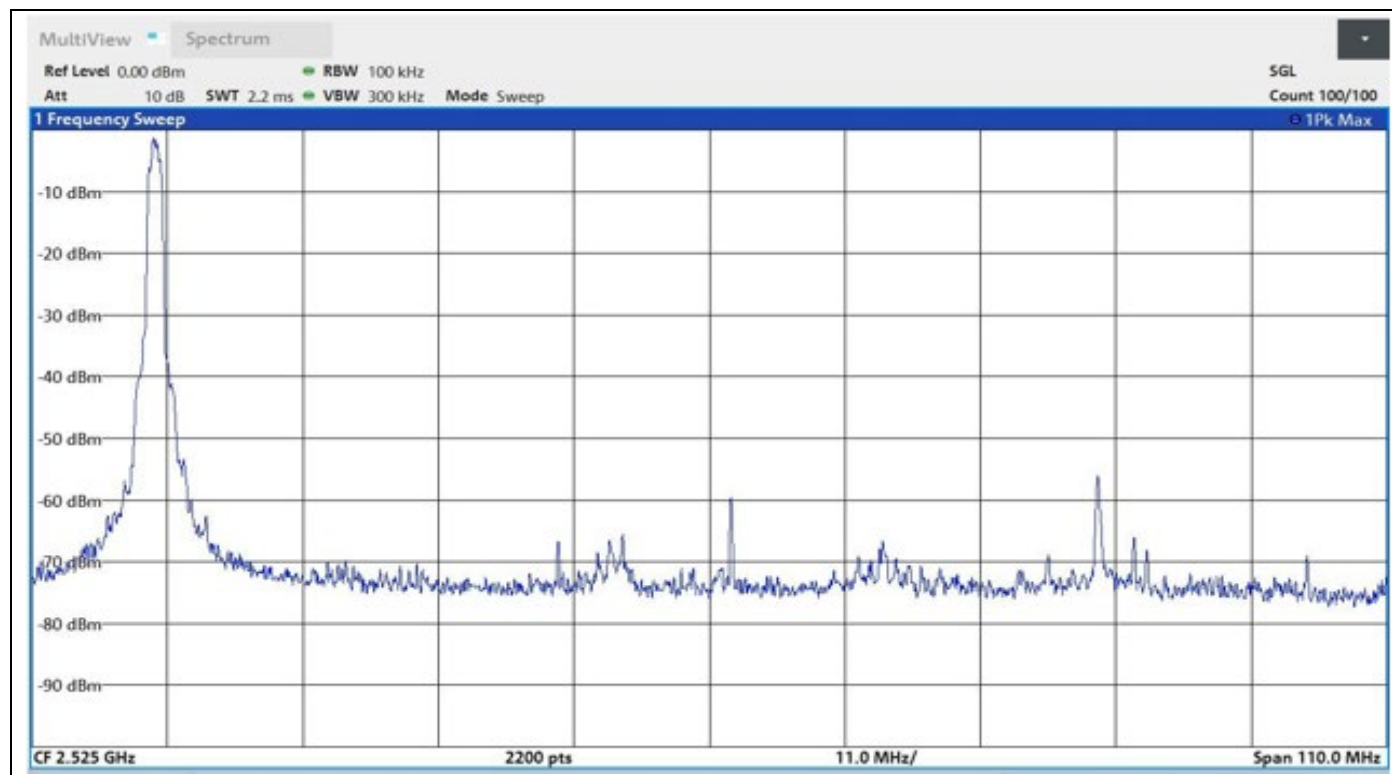
2480MHz 3-DH1

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2556.525000	-51.0	33.6	-17.3	PASS
2556.575000	-51.0	33.6	-17.3	PASS
2556.475000	-51.5	34.2	-17.3	PASS
2556.625000	-52.8	35.5	-17.3	PASS
2556.425000	-53.7	36.4	-17.3	PASS
2526.775000	-54.6	37.3	-17.3	PASS
2526.725000	-54.8	37.4	-17.3	PASS
2556.675000	-55.5	38.2	-17.3	PASS
2526.825000	-55.7	38.4	-17.3	PASS
2556.375000	-56.0	38.7	-17.3	PASS
2526.675000	-56.6	39.3	-17.3	PASS
2556.725000	-56.8	39.5	-17.3	PASS
2556.775000	-57.6	40.3	-17.3	PASS
2556.325000	-58.2	40.9	-17.3	PASS
2526.875000	-58.3	41.0	-17.3	PASS

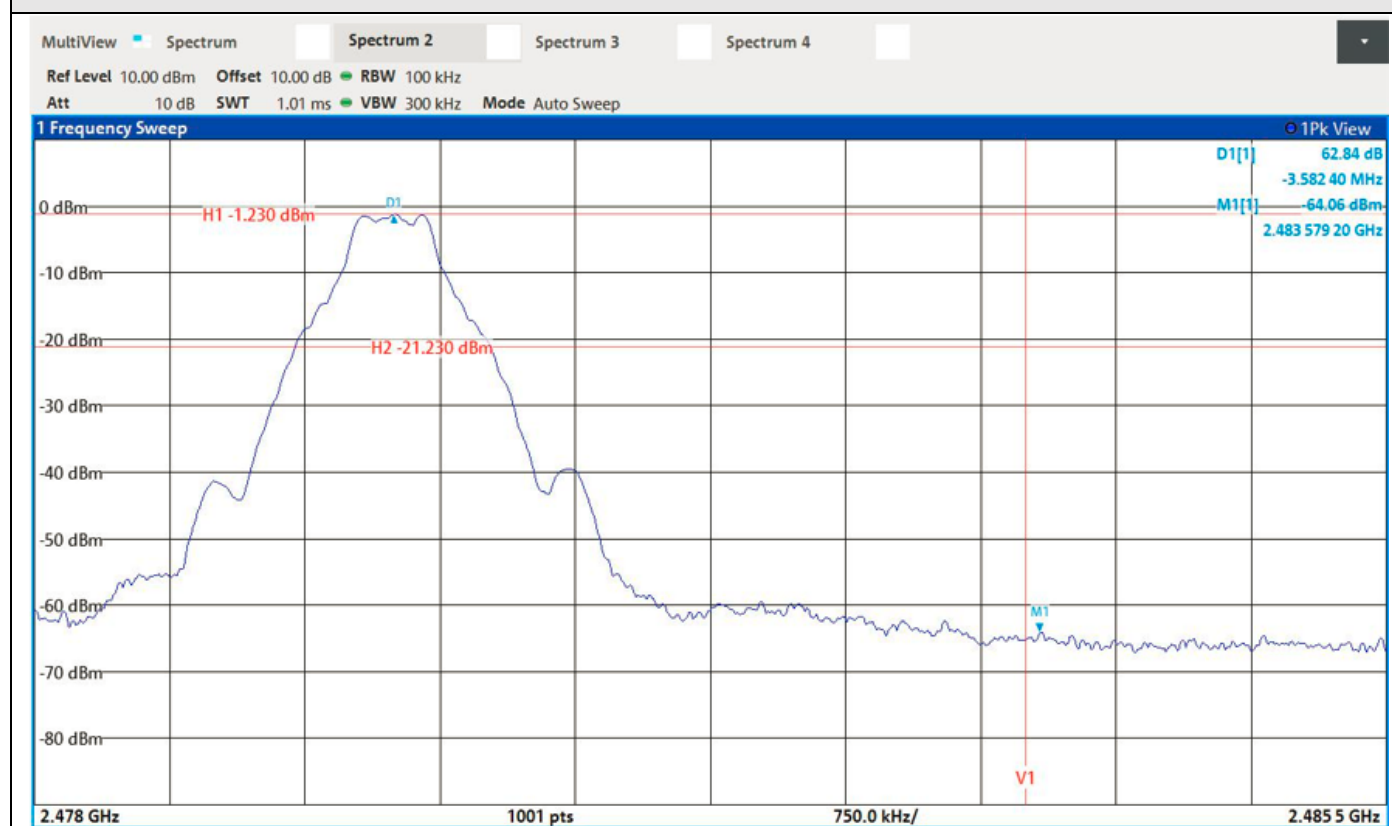
Band Edge



— Limit — Sum Level × Fail



2480MHz DH1

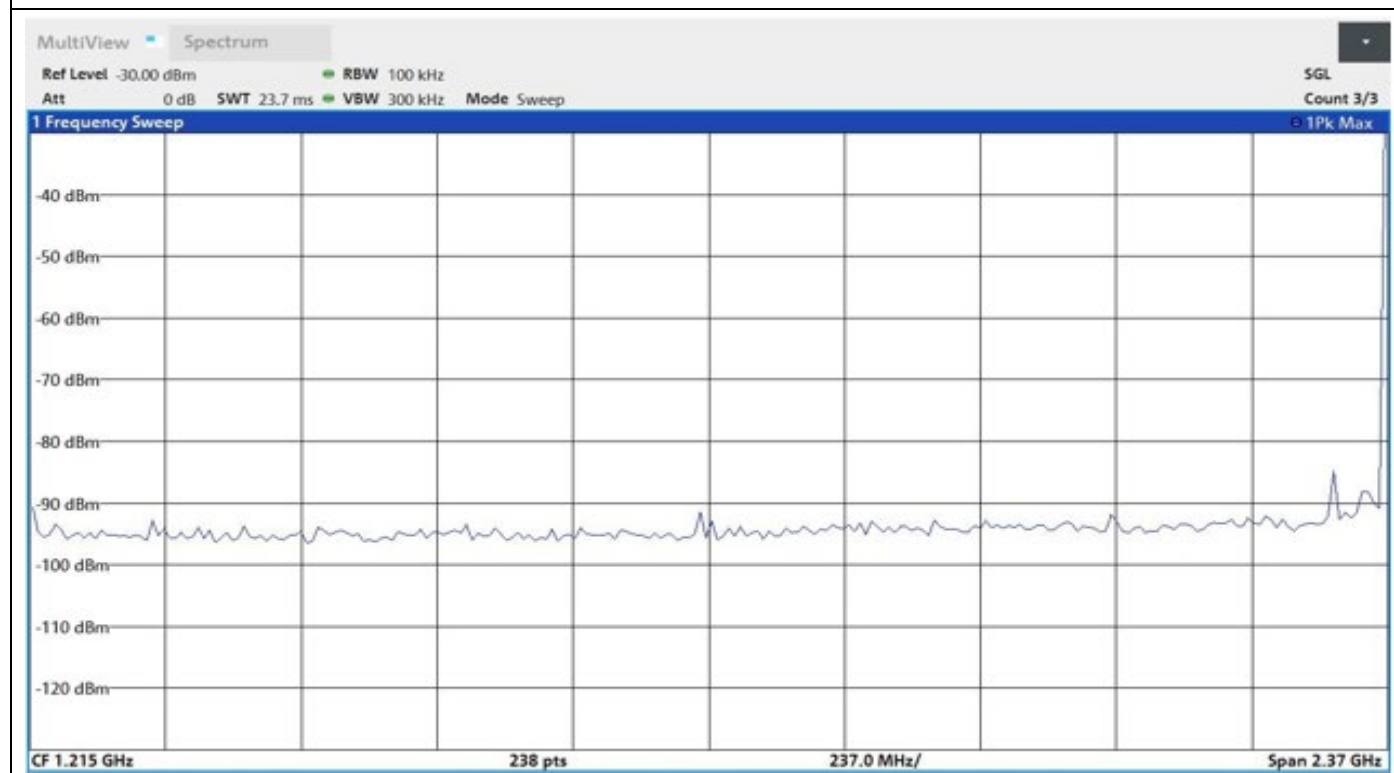
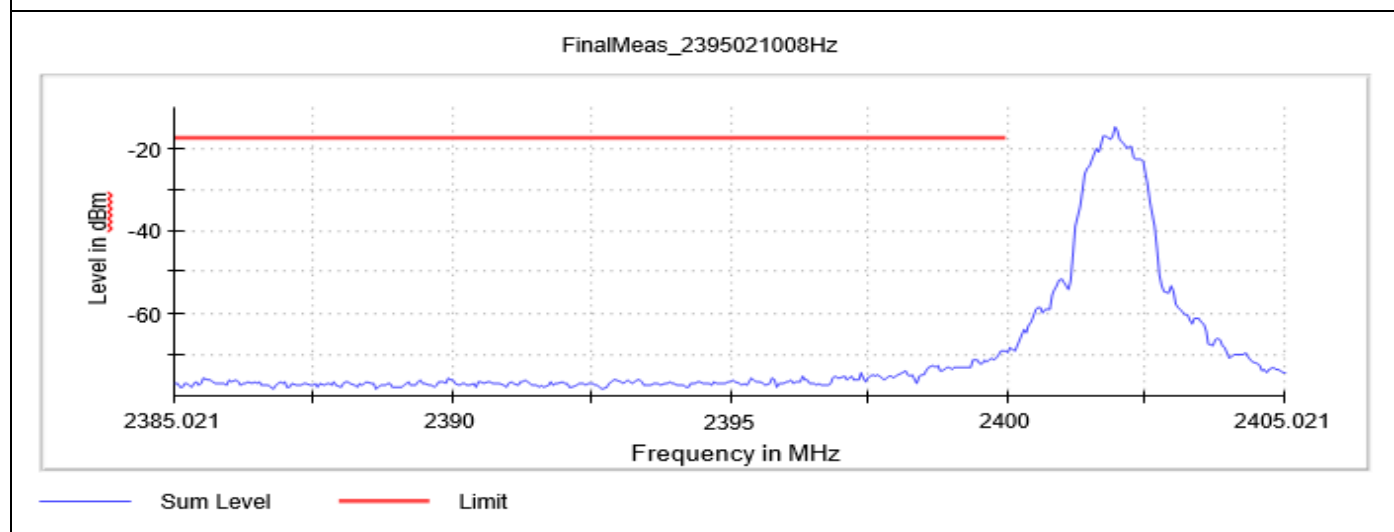
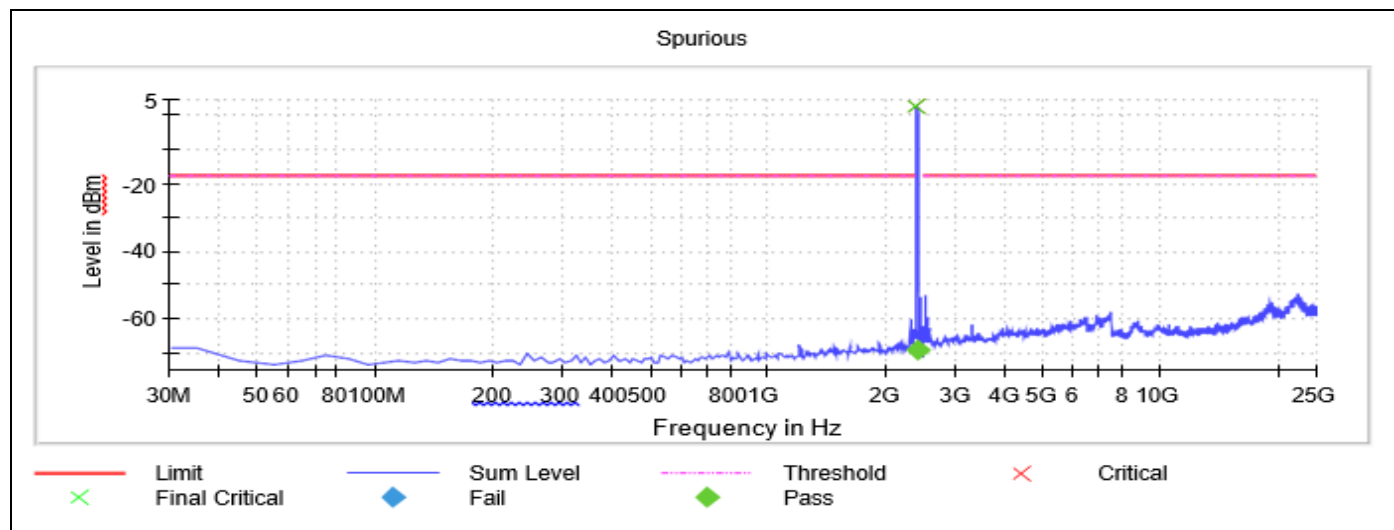


Tx Spurious Emission

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 7.8.8 and ANSI C63.10-2013

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB

2402MHz 3-DH1				
Final Measurement				
Frequency (MHz)	Level Pre Measurement (dBm)	Level (dBm)	Margin (dB)	Limit (dBm)
2399.908789	2.6	-69.0	51.6	-17.4
Pre Measurement				
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	
2395.021008	2.9	-20.4	-17.4	
22436.536951	-52.7	35.2	-17.4	
2508.485020	-53.3	35.8	-17.4	
22156.704727	-53.3	35.8	-17.4	
22086.746671	-53.3	35.8	-17.4	
22116.728695	-53.3	35.9	-17.4	
22136.716711	-53.4	36.0	-17.4	
22066.758655	-53.5	36.1	-17.4	
22336.596871	-53.6	36.1	-17.4	
22096.740679	-53.6	36.1	-17.4	
22606.435087	-53.7	36.2	-17.4	
22256.644807	-53.7	36.3	-17.4	
22146.710719	-53.8	36.3	-17.4	
22196.680759	-53.8	36.3	-17.4	
22126.722703	-53.9	36.5	-17.4	

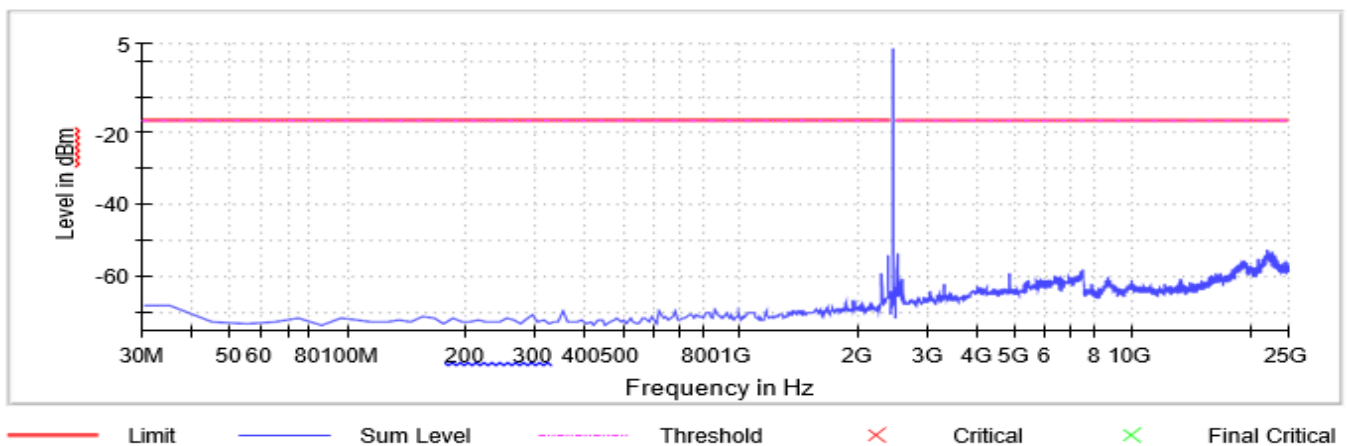


2441MHz 3-DH1

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22146.710719	-52.4	35.8	-16.6
22096.740679	-53.0	36.4	-16.6
22166.698735	-53.1	36.5	-16.6
22566.459055	-53.2	36.6	-16.6
22226.662783	-53.4	36.8	-16.6
2498.491012	-53.6	37.0	-16.6
21946.830559	-53.8	37.2	-16.6
22036.776631	-53.8	37.2	-16.6
22186.686751	-53.8	37.2	-16.6
22116.728695	-53.9	37.3	-16.6
22046.770639	-53.9	37.3	-16.6
22206.674767	-54.0	37.3	-16.6
22056.764647	-54.0	37.4	-16.6
22016.788615	-54.0	37.4	-16.6
21996.800599	-54.0	37.4	-16.6

Spurious

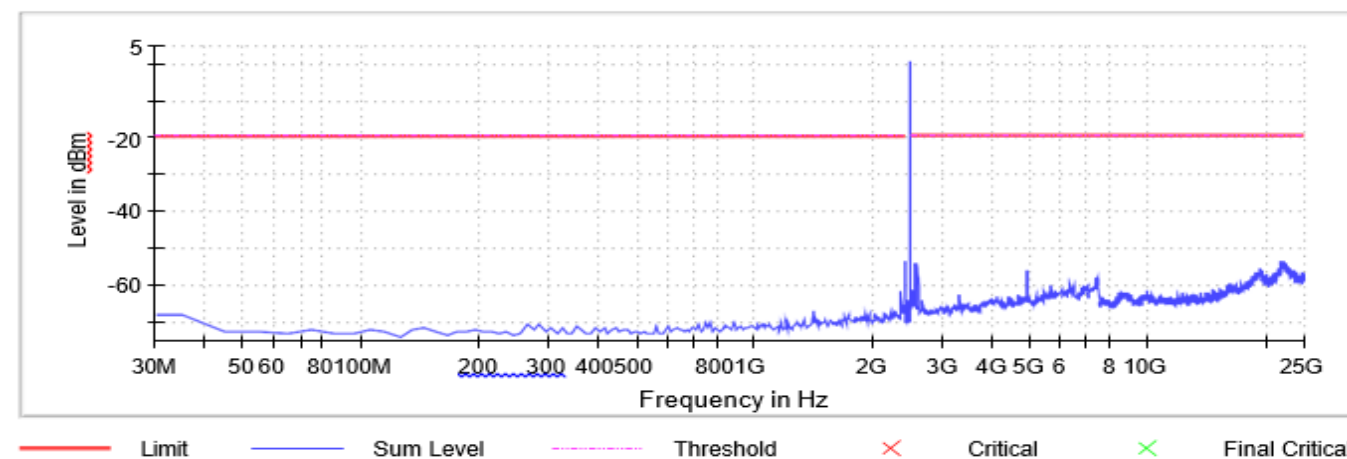


2480MHz 3-DH1

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
22086.746671	-53.3	33.7	-19.6
22056.764647	-53.4	33.8	-19.6
22156.704727	-53.5	33.9	-19.6
22166.698735	-53.5	33.9	-19.6
22126.722703	-53.6	34.0	-19.6
21876.872503	-53.6	34.1	-19.6
22046.770639	-53.6	34.1	-19.6
22106.734687	-53.7	34.2	-19.6
2548.461052	-53.8	34.2	-19.6
22146.710719	-53.8	34.3	-19.6
2598.431092	-53.9	34.3	-19.6
22076.752663	-53.9	34.4	-19.6
22116.728695	-54.0	34.5	-19.6
22096.740679	-54.1	34.5	-19.6
22426.542943	-54.1	34.5	-19.6

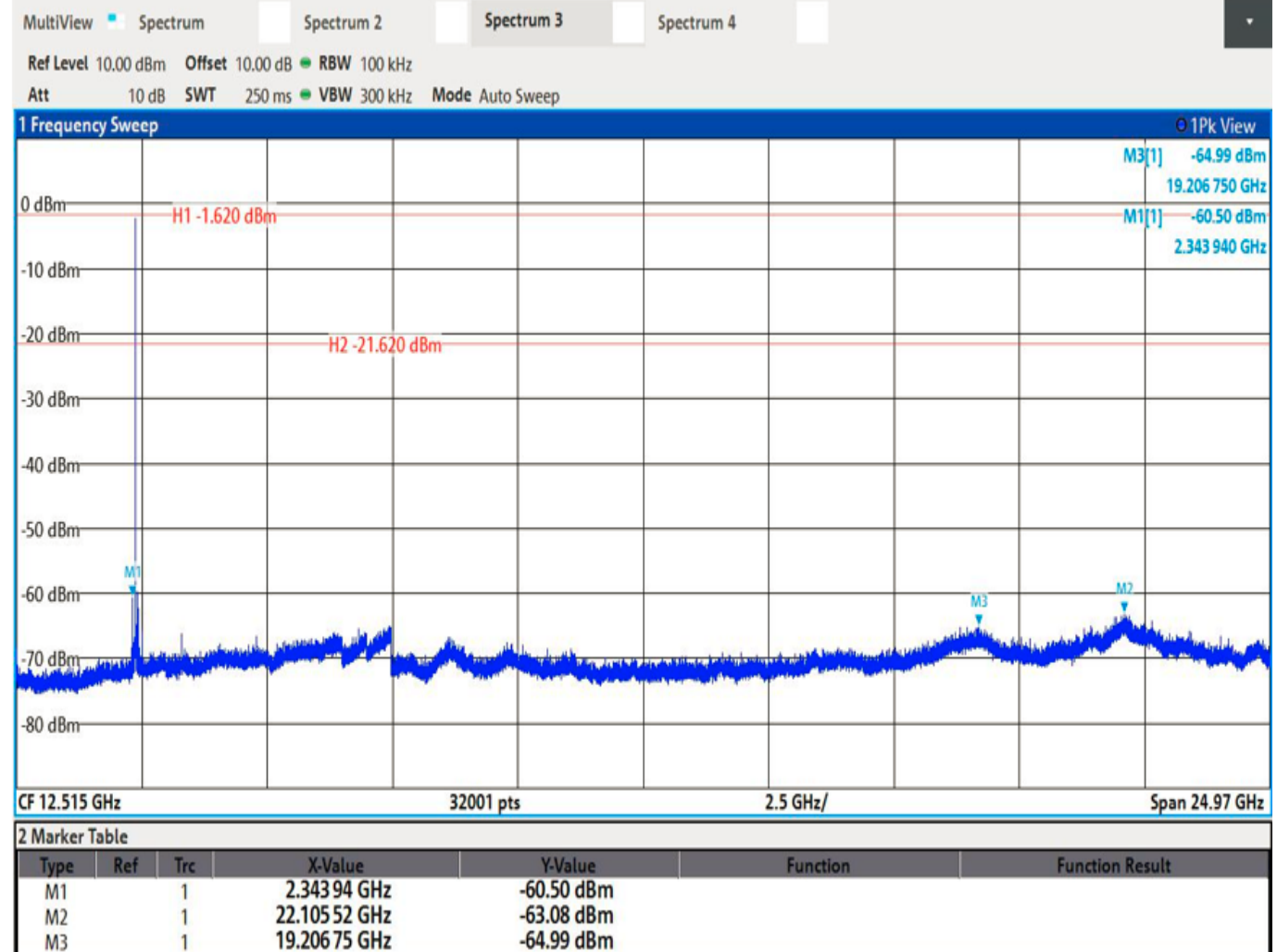
Spurious



2402MHz DH1

Pre Measurement

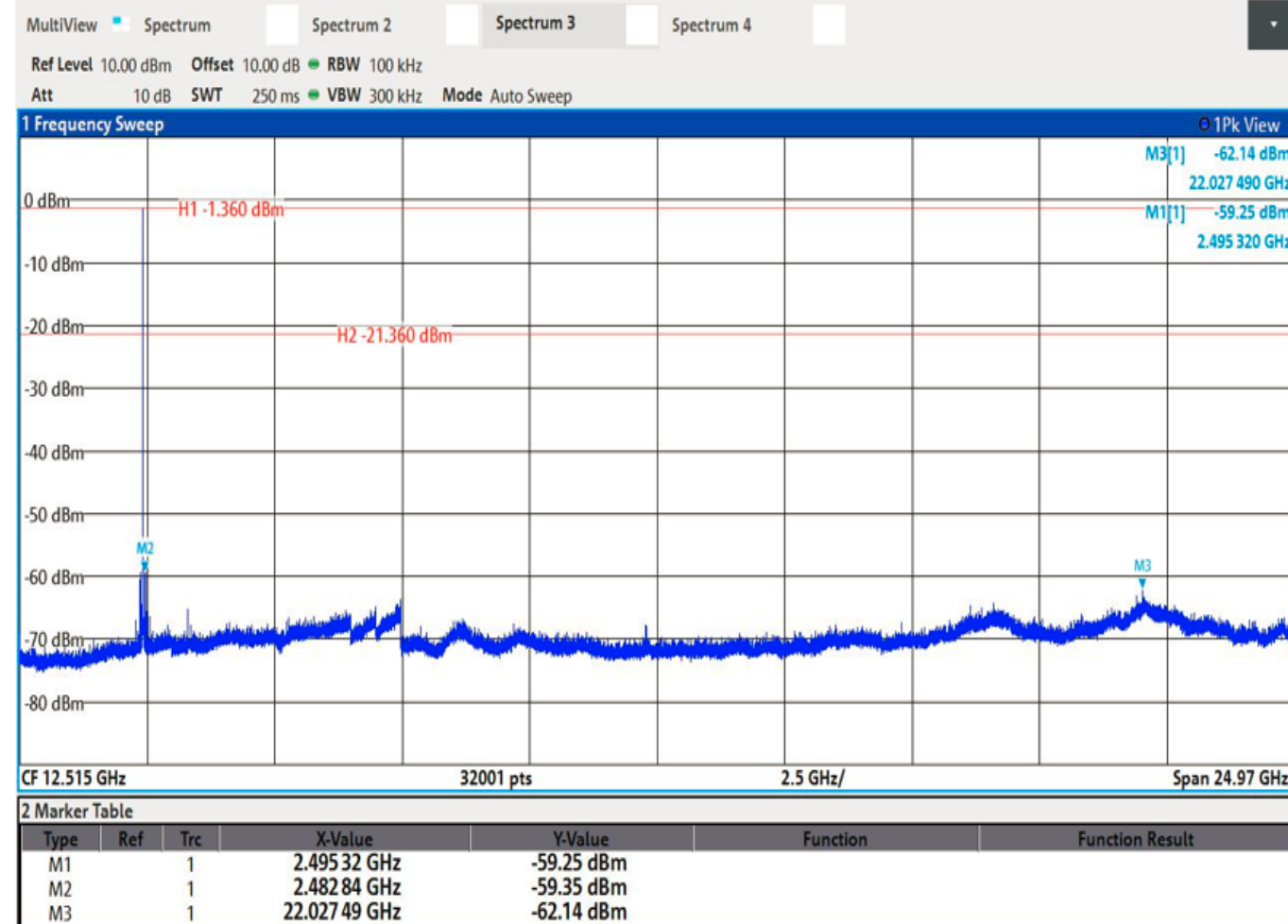
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2343.94	-60.50	38.9	-21.6
2210.552	-63.08	41.48	-21.6
1920.675	-64.99	43.39	-21.6



2441MHz DH1

Pre Measurement

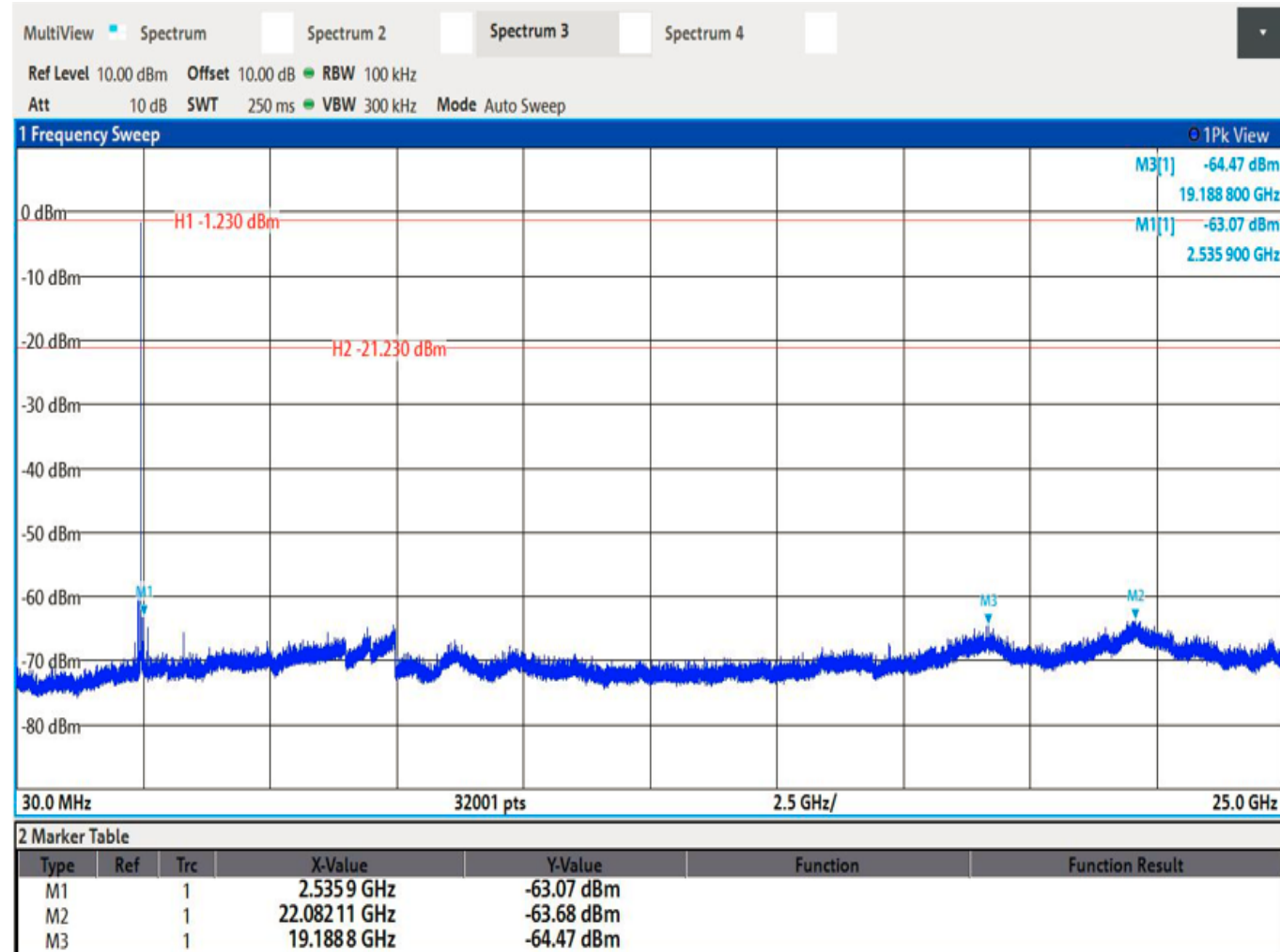
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2495.32	-59.25	37.95	-21.3
2482.84	-59.35	38.05	-21.3
2202.749	-62.14	40.84	-21.3



2480MHz DH1

Pre Measurement

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2535.9	-63.07	41.87	-21.2
2208.211	-63.68	42.48	-21.2
1918.88	-64.47	43.27	-21.2



• Radiated Testing

Test Summary

Start: 03/09/2022	End: 03/19/2022	Temperature: 23.6°C Humidity: 21 %R.H.	Initials: RP/AB
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DUT S/N	AH22021401-HAR-004#3		DUT Operating Mode	BT Classic
Comment	3 DH-1			
Antenna	Frequency Range	Polarization	Result Over/Under Limit	Notes
Loop	9kHz-30MHz	Parallel	☐ Over ☒ Under	√
		Perpendicular	☐ Over ☒ Under	√
		Ground-Parallel	☐ Over ☒ Under	√
Log Periodic	30MHz-1GHz	Horizontal	☐ Over ☒ Under	√
		Vertical	☐ Over ☒ Under	√
Horn	1GHz-18GHz	Horizontal	☐ Over ☒ Under	√
		Vertical	☐ Over ☒ Under	√
Horn	18GHz-27.5GHz	Horizontal	☐ Over ☒ Under	√
		Vertical	☐ Over ☒ Under	√

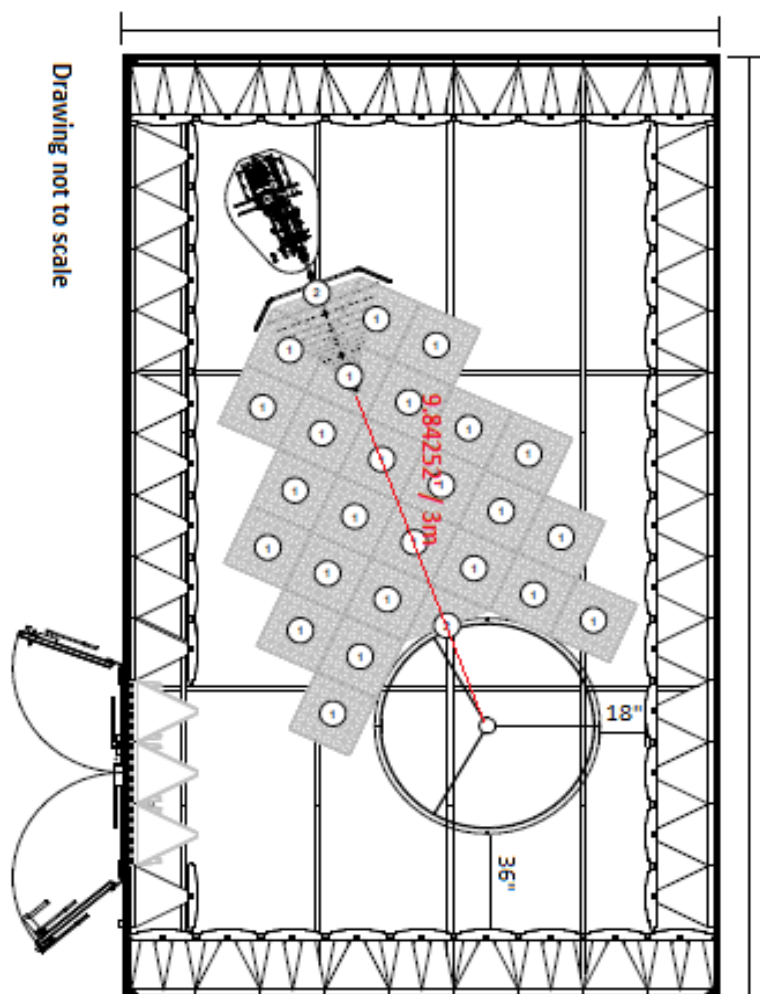
Notes: √ meets the requirements of the acceptance criteria.

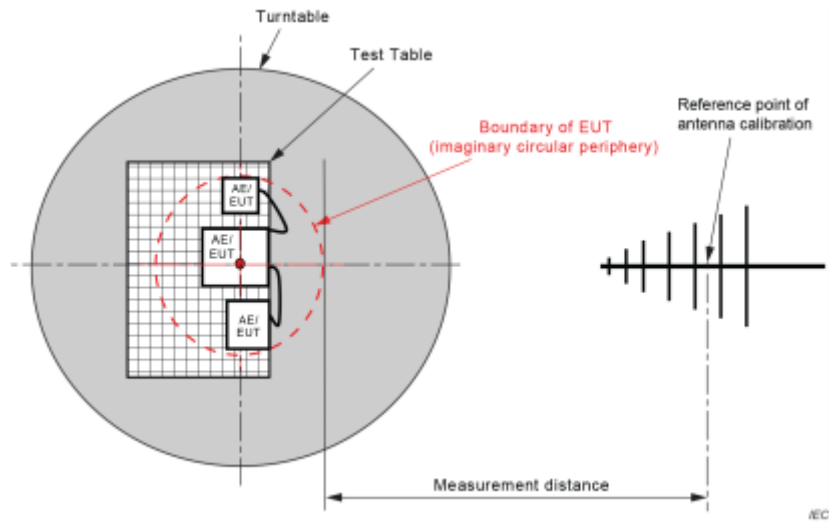
Test Setup

Semi-Anechoic Chamber Test Site-3 meter

Chamber Location	815 N Opdyke Rd Auburn Hills, Michigan 48326
Chamber Manufacturer:	ETS-Lindgren
Chamber Type	Semi-Anechoic
Model	FACT™ 3-2.0 Plus
Chamber Dimensions (L x W x H)	18'x18'x30'
Quiet Zone Diameter	2.0 meters
Quiet Zone Test Heights	1 & 2 meters (front only)
Test Distance	3.0 meters
Test Frequency Range	1-40 GHz
Measured Performance	4.87 dB Site sVSWR

Chamber Dimensions





Test Equipment Used

ID #	Equipment	Manufacturer	Model	Serial #	Cal Due
BVD0217	Receiver 2Hz-44GHz	Rohde & Schwarz	ESW44	101871	04/16/2022
BVD0398	Double Shielded N-Type Cable 2 Meter	Rohde & Schwarz	N-Type	N/A	12/29/2022
BVD0407	Double Shielded N-Type Cable 410mm (For PreAmp)	Rohde & Schwarz	N-Type	N/A	08/05/2022
BVD0394	Double Shielded N-Type Cable 6.9 Meter	Rohde & Schwarz	N-Type	N/A	03/04/2023
BVD0184	Preamplifier 29dB 1-18GHz	Rohde & Schwarz	TS-PR18	101646	04/26/2022
BVD0480	Band Reject Filter 50dB from 2400 to 2500MHz	Micro-Tronics	BRM50702	G482	05/27/2022
BVD0481	Band Reject Filter 40dB from 5150 to 5880MHz	Micro-Tronics	BRM50716	G336	05/27/2022
BVD0267	Double Ridge Waveguide 800MHz- 18GHz	Rohde & Schwarz	HF907	102832	09/09/2022
BVD0486	Sucoflex K-Type Coaxial Cable 5 Meter	Huber+Suhner, inc	K-Type Coaxial	474343	03/07/2023
BVD0185	Preamplifier 45dB 18-40GHz	Rohde & Schwarz	TS-PR1840	100064	03/22/2022
BVD0320	18-40GHz Horn Antenna	L3 Narda ATM	PNR 180-442- KF	136164-01	04/08/2022
BVD0186	Preamplifier 25dB cal to 100kHz-1GHz	Rohde & Schwarz	TS-PR1	102080	04/05/2022
BVD0405	Double Shielded N-Type Cable 440mm (For PreAmp)	Rohde & Schwarz	N-Type	N/A	08/10/2022
BVD0021	UltraLog Antenna 30-6000 MHz	Rohde & Schwarz	HL562E	101113	07/23/2022
BVD0118	Antenna Mast Position Controller	ETS	7006-001	00214778/0 0214648	N/A
BVD0112	Equipment Chamber for 3 Meter Chamber	ETS	N/A	N/A	N/A
BVD0111	3 Meter Anechoic Chamber	ETS	N/A	N/A	10/16/2022
BVD0247	Turn Table	ETS	920250	N/A	N/A
BVD0323	Foam Test Table For 3 Meter Chamber	ETS-Lindgren	LDT-1.5	N/A	N/A
BVD0069	Bore Sight Tower	ETS	2171B	226732	N/A
BVD0258	Optima 12V Blue top Marine battery	Optima	D34M	N/A	N/A
BVD0011	Loop Antenna 9kHz-30MHz	Rohde & Schwarz	FMZB1519B	145	03/23/2022
BVD0341	Temp and Humidity Chart Recorder	Omega	ITHX-SD	M20150306	N/A
BVD0394	Double Shielded N-Type Cable 6.9 Meter	Rohde & Schwarz	N-Type	N/A	03/04/2023

Equipment List (Software)

Equipment	Manufacturer	Model	Version No.
EMC Test Software	Nexio	BAT-EMC	3.21.0.18

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	Cable Harness	Harman	1.7m	N/A	N/A
N/A	USB Hub	Harman	N/A	3526408	N/A
N/A	USB 2.0 Ethernet Adapter	Trendnet	TU2-ET100	RA0JU56004466	V6.0R

Test Plots

Uncertainty

Radiated Emissions (30MHz to 18GHz)

Test Engineer: Ryan Phillips

The test is to measure the radiated emissions of the EUT. Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

30MHz to 1GHZ

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	2.449	1	0.1768033
NSA Calibration	4.0	Triangular	1.414	1	1.633332
ETS Foam Table (LDT-1.5)	1.8	Rectangular	1.732	1	1.039261
Combined Standard Uncertainty (square root of the sum of the squares)					2.113781
Expanded Uncertainty (K=2)					4.227562

The total derived measurement uncertainty is +/- 4.228 dB

1GHz to 40GHz

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105000
Filter Insertion Loss	0.25	Normal	2	1	0.125000
Antenna Factor	0.65	Normal	2	1	0.325000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.866051
PRF Response	1.5	Rectangular	1.732	1	0.866051
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.176803
VSWR Calibration	2.0	Triangular	2.449	1	0.816659
ETS Foam Table (LDT-1.5)	1.8	Rectangular	1.732	1	1.039261
Combined Standard Uncertainty (square root of the sum of the squares)					1.869213
Expanded Uncertainty (K=2)					3.738426

The total derived measurement uncertainty is +/- 3.738 dB.

Remarks:

1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

Remarks:

1. Level Peak Reading (dBμV/m) = Raw Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Peak Reading – Limit

Remarks:

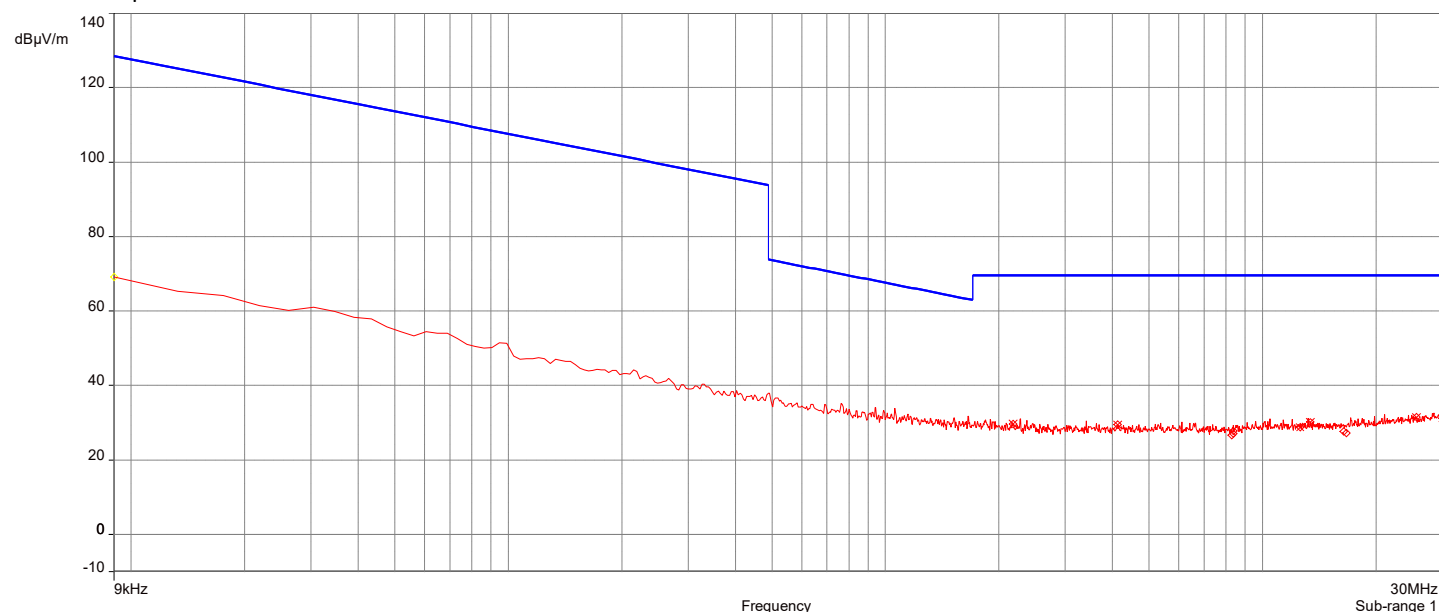
1. Level Average Reading (dBμV/m) = Raw Average Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Average Reading – Limit

AH22021401-HAR-004#3_BT_Ch 39_9kHz-30MHz_Ground-Parallel

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No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.177231MHz	29.58	19.21	69.54	-39.96	1.00	64.60	H/V	Passed
2.	4.126924MHz	29.52	19.39	69.54	-40.02	1.00	79.60	H/V	Passed
3.	12.577024MHz	28.75	19.83	69.54	-40.79	1.00	150.60	H/V	Passed
4.	13.404037MHz	30.17	19.85	69.54	-39.37	1.00	57.80	H/V	Passed
5.	25.590693MHz	31.57	20.89	69.54	-37.97	1.00	55.70	H/V	Passed
6.	30MHz	31.19	21.95	40.00	-8.81	1.00	273.20	H/V	Passed

Overall Graphs:



Remarks:

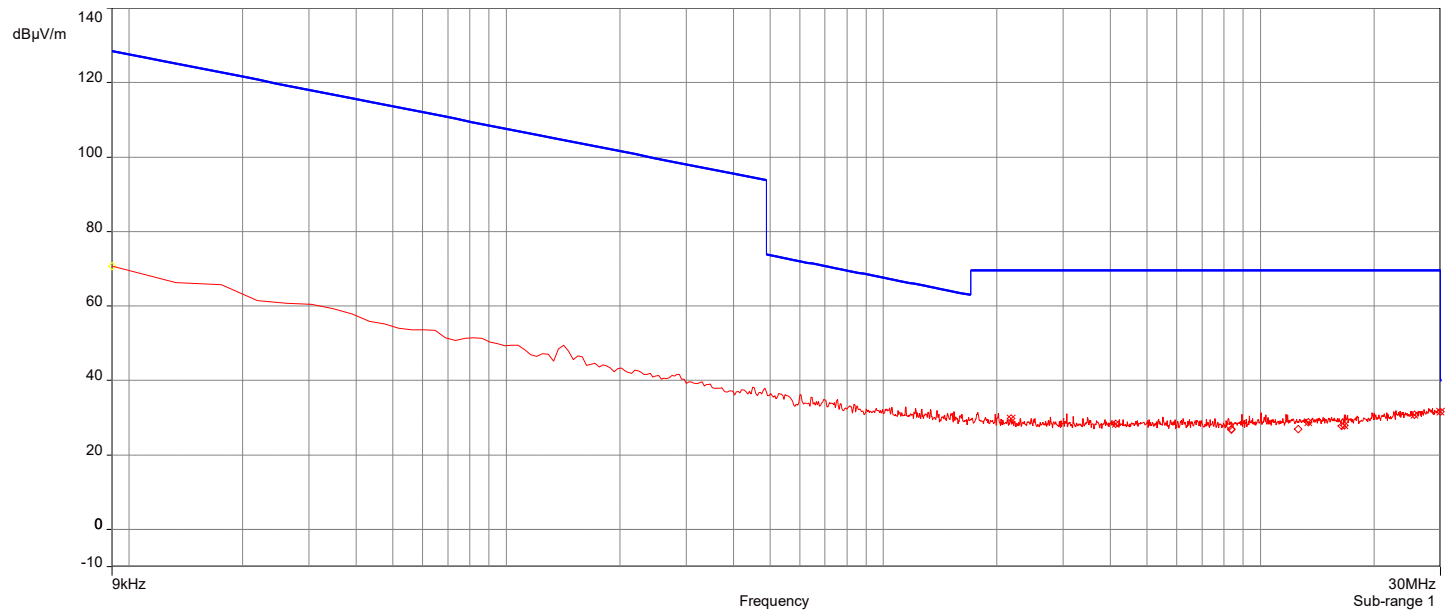
1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

AH22021401-HAR-004#3_BT_Ch 39_9kHz-30MHz_Parallel

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No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	2.177231MHz	29.85	19.21	69.54	-39.69	1.00	225.40	H/V	Passed
2	4.126924MHz	28.36	19.39	69.54	-41.18	1.00	5.20	H/V	Passed
3	13.408322MHz	28.79	19.85	69.54	-40.75	1.00	266.40	H/V	Passed
4	16.694949MHz	27.94	19.85	69.54	-41.60	1.00	279.40	H/V	Passed
5	25.624973MHz	30.78	20.89	69.54	-38.76	1.00	315.90	H/V	Passed
6	30MHz	31.57	21.95	40.00	-8.43	1.00	43.30	H/V	Passed

Overall Graphs:



Remarks:

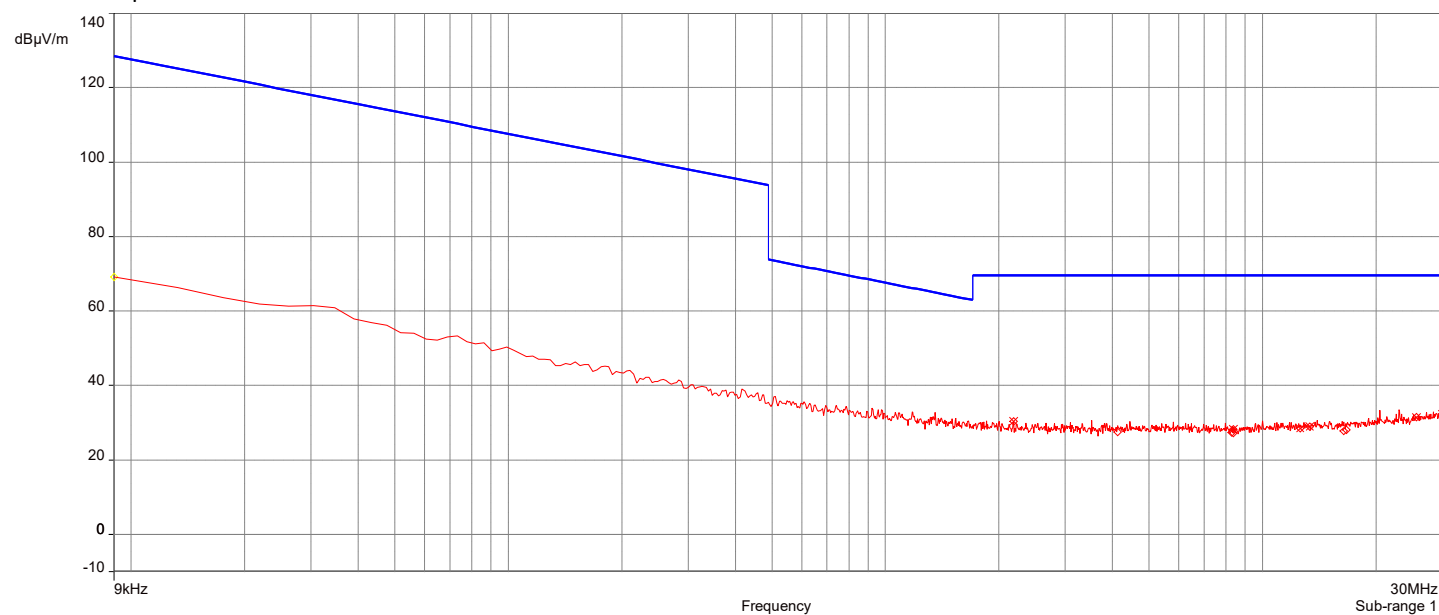
1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

AH22021401-HAR-004#3_BT_Ch 39_9kHz-30MHz_Perpendicular

3/19/2022 7:58:33 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	2.185801MHz	30.42	19.21	69.54	-39.12	1.00	191.40	H/V	Passed
2	8.38197MHz	28.30	19.28	69.54	-41.24	1.00	5.80	H/V	Passed
3	12.577024MHz	28.49	19.83	69.54	-41.05	1.00	258.80	H/V	Passed
4	13.361187MHz	28.93	19.85	69.54	-40.61	1.00	166.00	H/V	Passed
5	25.620688MHz	31.56	20.89	69.54	-37.98	1.00	131.60	H/V	Passed
6	30MHz	32.31	21.95	40.00	-7.69	1.00	133.90	H/V	Passed

Overall Graphs:



Remarks:

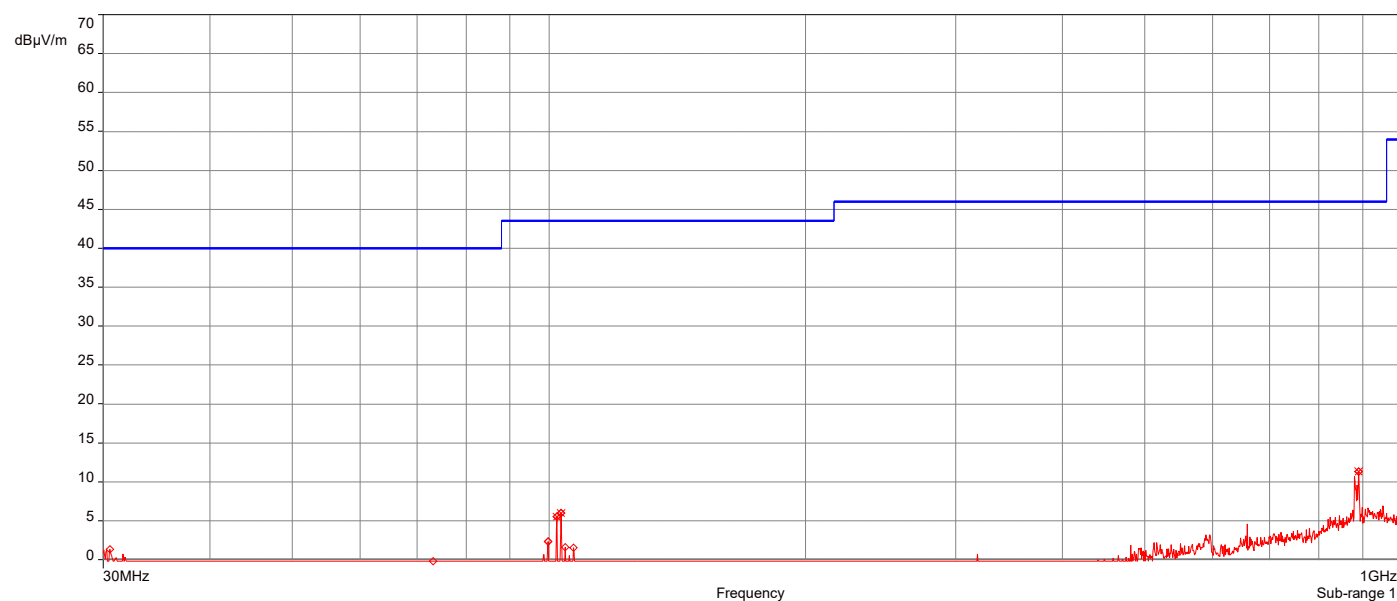
1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

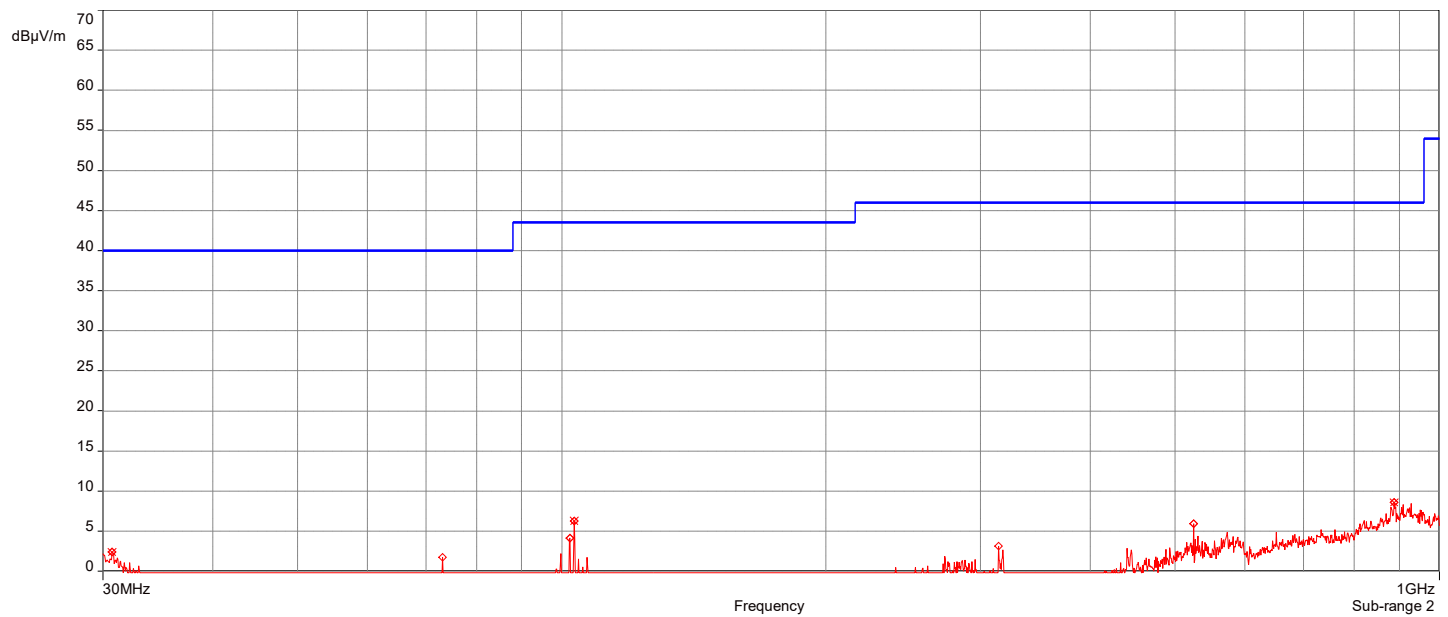
AH22021401-HAR-004#3_BT_Ch 0_30MHz-1GHz

3/9/2022 2:18:30 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	102.1266MHz	5.55	-12.84	43.50	-37.95	1.00	293.30	Vertical	Passed
2.	103.3249MHz	5.98	-12.88	43.50	-37.52	1.00	317.50	Vertical	Passed
3.	890.26943MHz	11.34	-1.35	46.00	-34.66	2.00	176.80	Vertical	Passed
4.	30.741808MHz	2.40	-5.30	40.00	-37.60	1.00	56.00	Horizontal	Passed
5.	103.3249MHz	6.28	-13.58	43.50	-37.22	2.75	18.00	Horizontal	Passed
6.	888.044MHz	8.57	-0.16	46.00	-37.43	1.75	225.30	Horizontal	Passed

Overall Graphs:





Remarks:

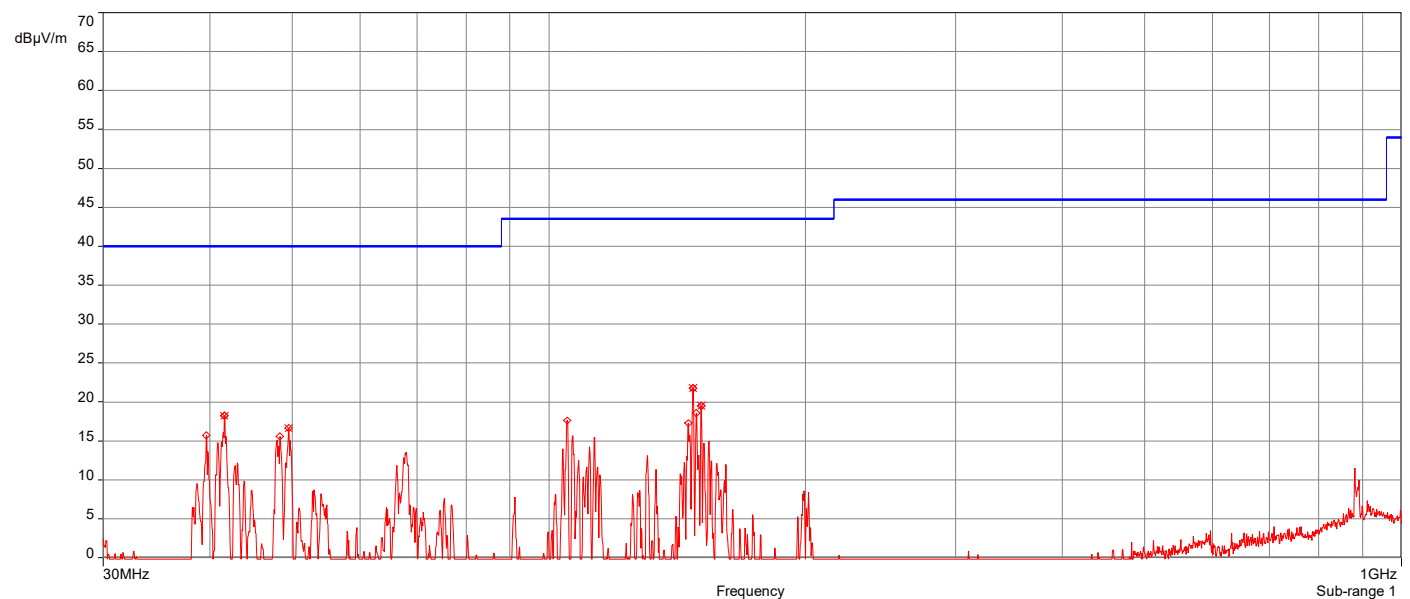
1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

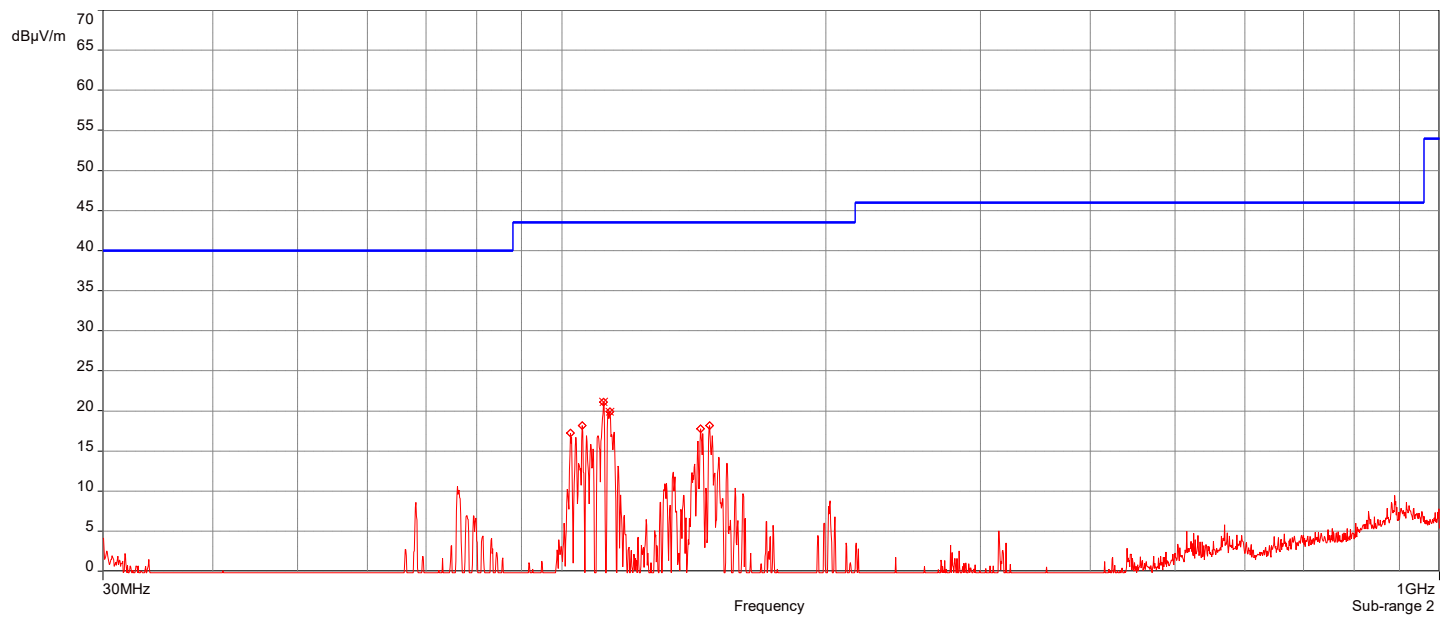
AH22021401-HAR-004#3_BT_Ch 39_30MHz-1GHz

3/9/2022 6:36:41 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	41.640685MHz	18.22	-13.32	40.00	-21.78	2.00	40.50	Vertical	Passed
2	49.515266MHz	16.67	-17.50	40.00	-23.33	1.75	117.40	Vertical	Passed
3	147.54809MHz	21.78	-15.27	43.50	-21.72	1.00	168.30	Vertical	Passed
4	150.8577MHz	19.51	-15.26	43.50	-23.99	1.00	168.30	Vertical	Passed
5	111.59892MHz	21.10	-13.02	43.50	-22.40	2.00	31.30	Horizontal	Passed
6	113.42491MHz	19.90	-13.04	43.50	-23.60	3.25	235.20	Horizontal	Passed

Overall Graphs:





Remarks:

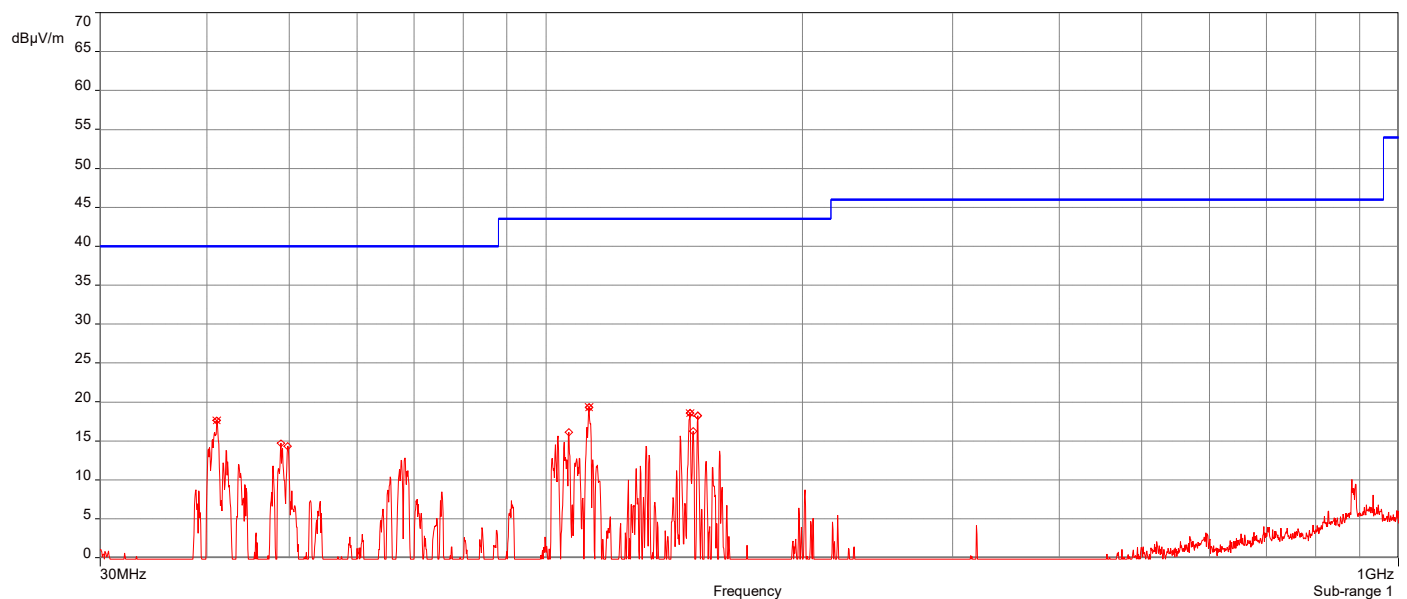
1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

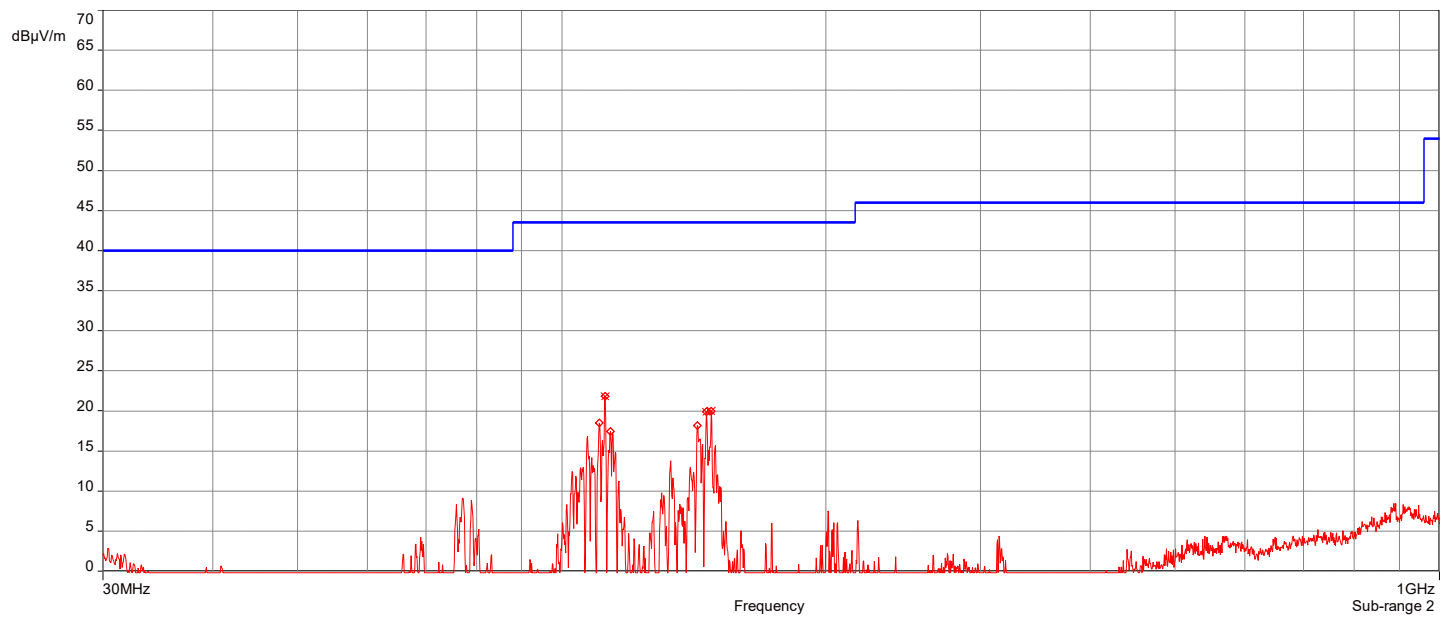
AH22021401-HAR-004#3_BT_Ch 78_30MHz-1GHz

3/9/2022 5:57:06 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	41.127125MHz	17.63	-13.02	40.00	-22.37	1.75	358.90	Vertical	Passed
2	112.39779MHz	19.30	-11.82	43.50	-24.20	2.75	71.50	Vertical	Passed
3	147.49103MHz	18.55	-15.27	43.50	-24.95	1.75	204.80	Vertical	Passed
4	111.99835MHz	21.86	-13.02	43.50	-21.64	2.50	168.80	Horizontal	Passed
5	146.23566MHz	19.90	-15.20	43.50	-23.60	2.00	239.30	Horizontal	Passed
6	148.06165MHz	19.99	-15.28	43.50	-23.51	2.75	54.40	Horizontal	Passed

Overall Graphs:





Remarks:

1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

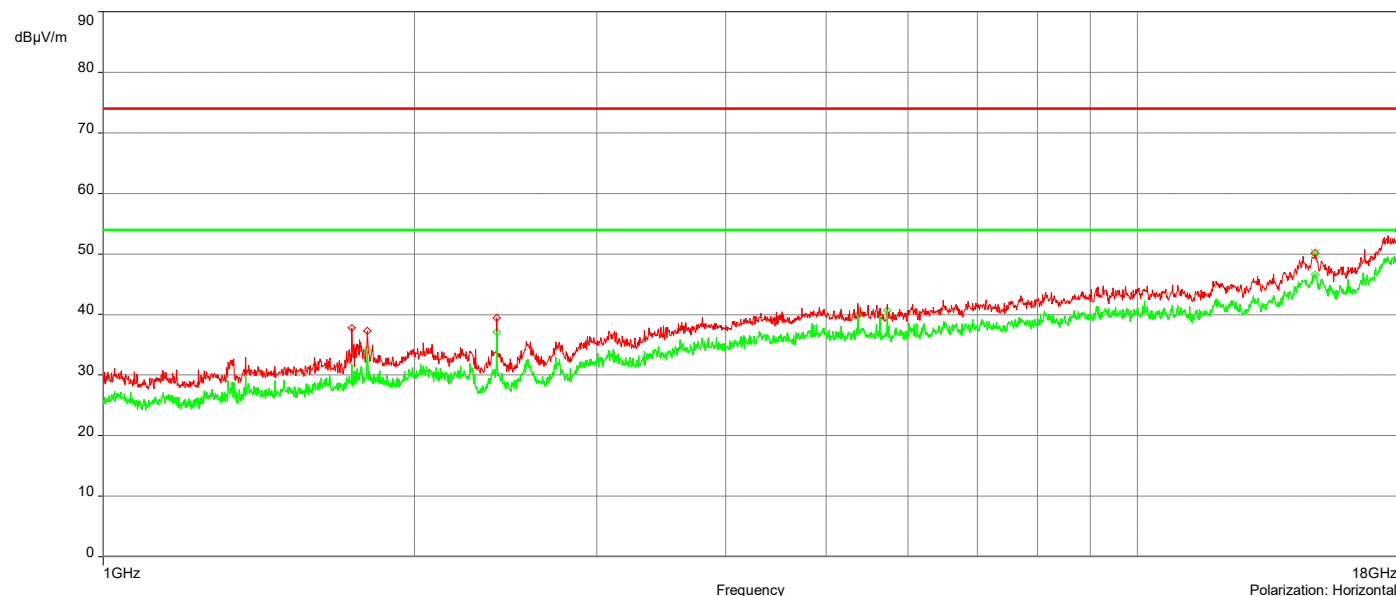
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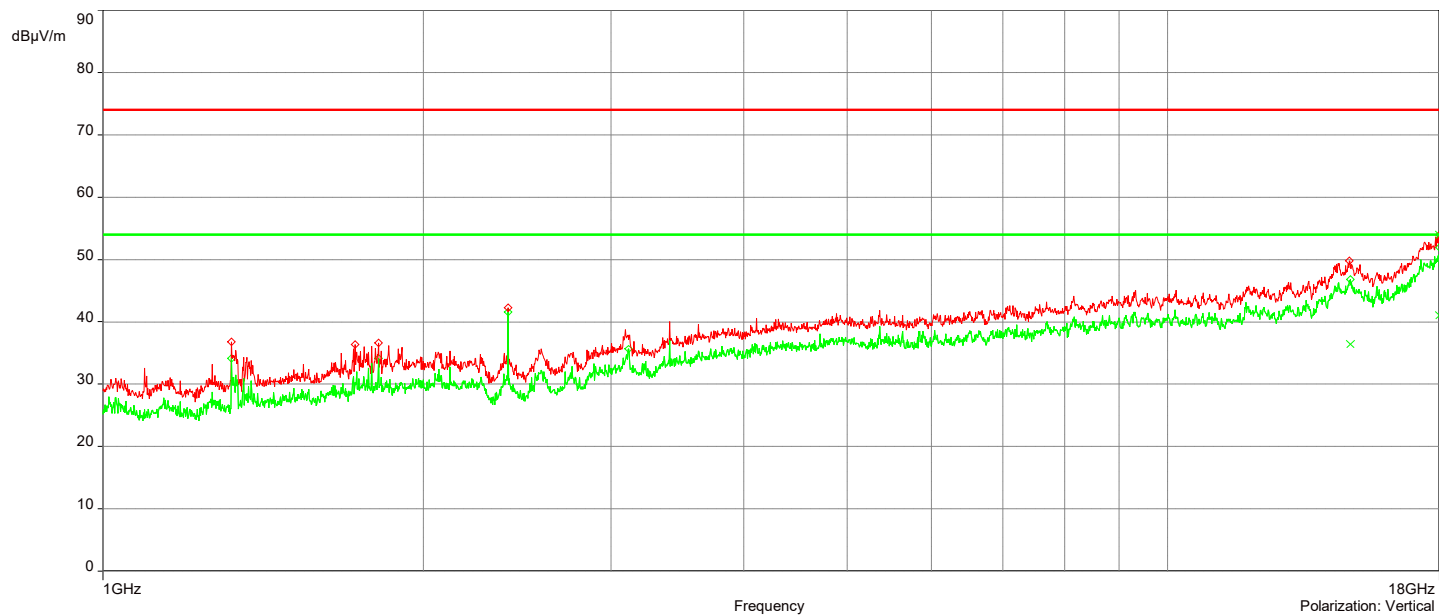
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No	Frequency (MHz)	Level Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	17.9935GHz	53.97	19.67	74.00	-20.03	2.00	21.70	Vertical	Passed
2.	14.841907GHz	50.17	15.01	74.00	-23.83	2.50	237.20	Horizontal	Passed
3.	17.919998GHz	53.77	18.49	74.00	-20.23	1.00	240.70	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	14.839407GHz	36.49	14.94	54.00	-17.51	3.50	89.10	Vertical	Passed
2.	17.9935GHz	41.10	19.67	54.00	-12.90	2.00	21.70	Vertical	Passed
3.	17.966999GHz	40.77	19.16	54.00	-13.23	1.00	291.90	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBµV/m) = Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBµV/m) = Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

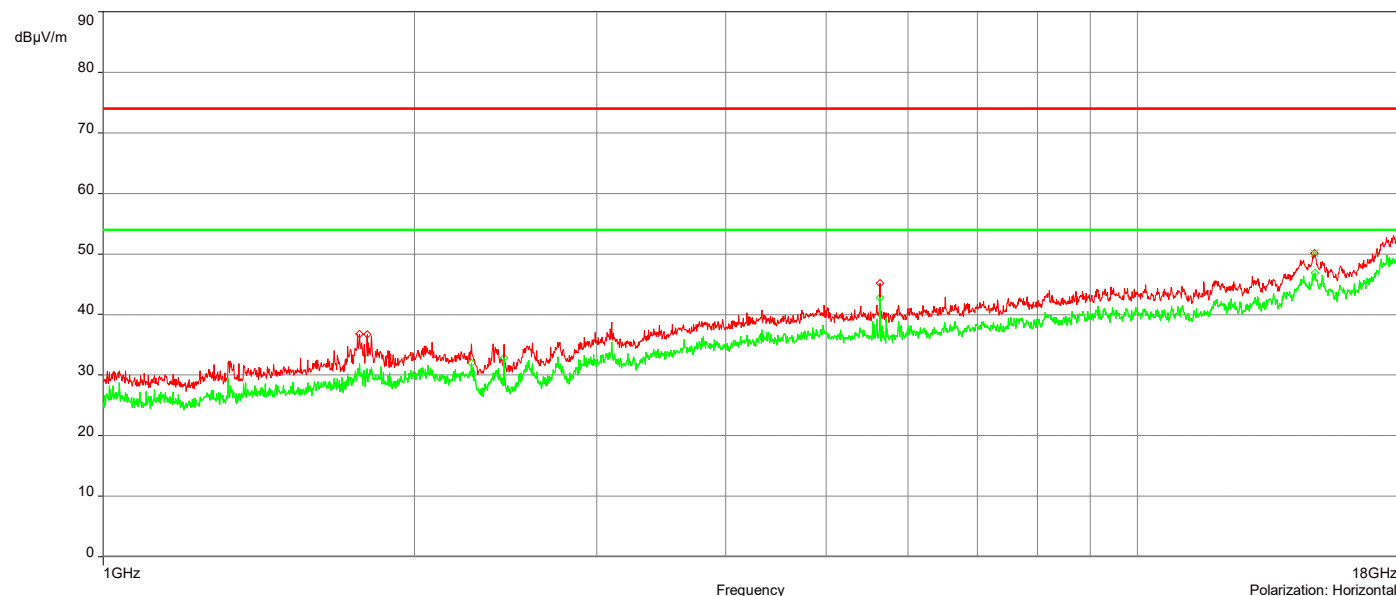
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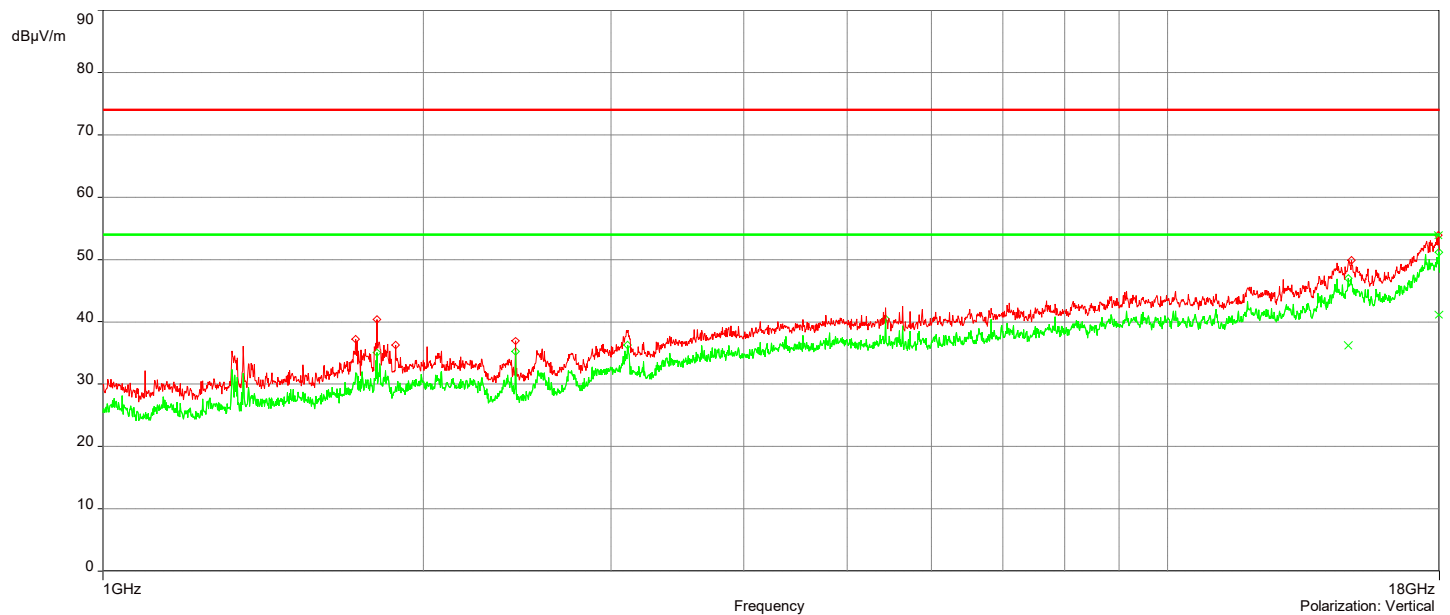
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No	Frequency (MHz)	Level Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	17.961499GHz	53.95	19.09	74.00	-20.05	2.50	359.90	Vertical	Passed
2	14.830907GHz	50.13	15.17	74.00	-23.87	4.00	27.20	Horizontal	Passed
3	17.979999GHz	53.55	19.25	74.00	-20.45	4.00	143.00	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	14.784405GHz	36.18	14.62	54.00	-17.82	1.00	246.10	Vertical	Passed
2	17.9855GHz	41.13	19.45	54.00	-12.87	1.50	350.10	Vertical	Passed
3	17.994GHz	40.71	19.68	54.00	-13.29	2.00	359.90	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBµV/m) = Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBµV/m) = Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

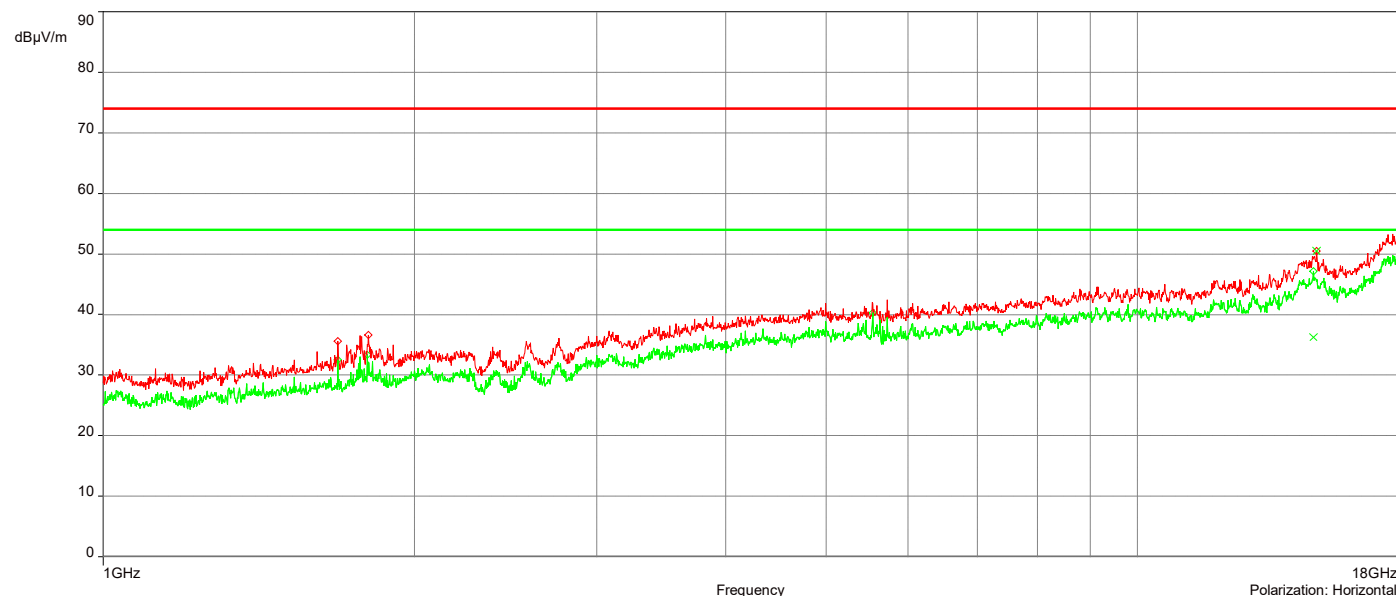
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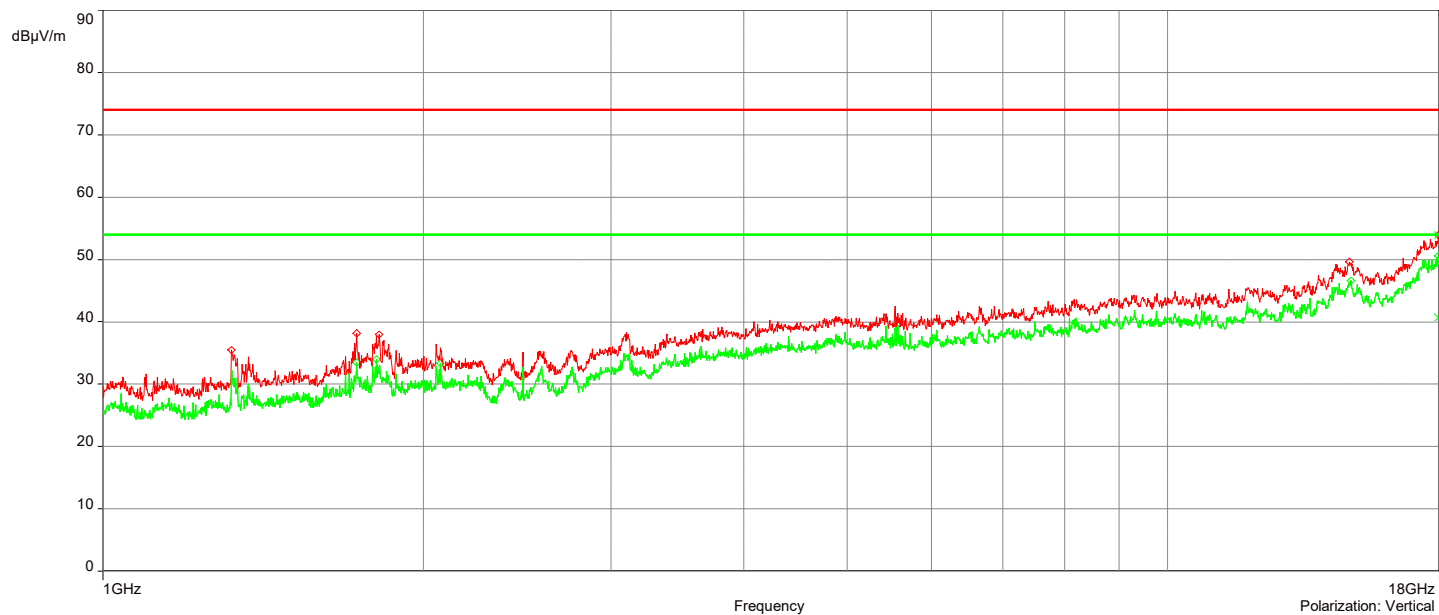
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No	Frequency (MHz)	Level Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	17.958999GHz	53.87	19.07	74.00	-20.13	4.00	0.10	Vertical	Passed
2	14.894409GHz	50.51	14.24	74.00	-23.49	3.50	127.20	Horizontal	Passed
3	17.9975GHz	53.90	19.76	74.00	-20.10	4.00	206.20	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	17.954499GHz	40.73	18.91	54.00	-13.27	3.00	145.10	Vertical	Passed
2	14.792906GHz	36.31	14.82	54.00	-17.69	1.50	114.10	Horizontal	Passed
3	17.9855GHz	41.20	19.41	54.00	-12.80	4.00	243.10	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBµV/m) = Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBµV/m) = Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

AH22021401-HAR-004#3_BT_Ch 0_18-27.5GHz

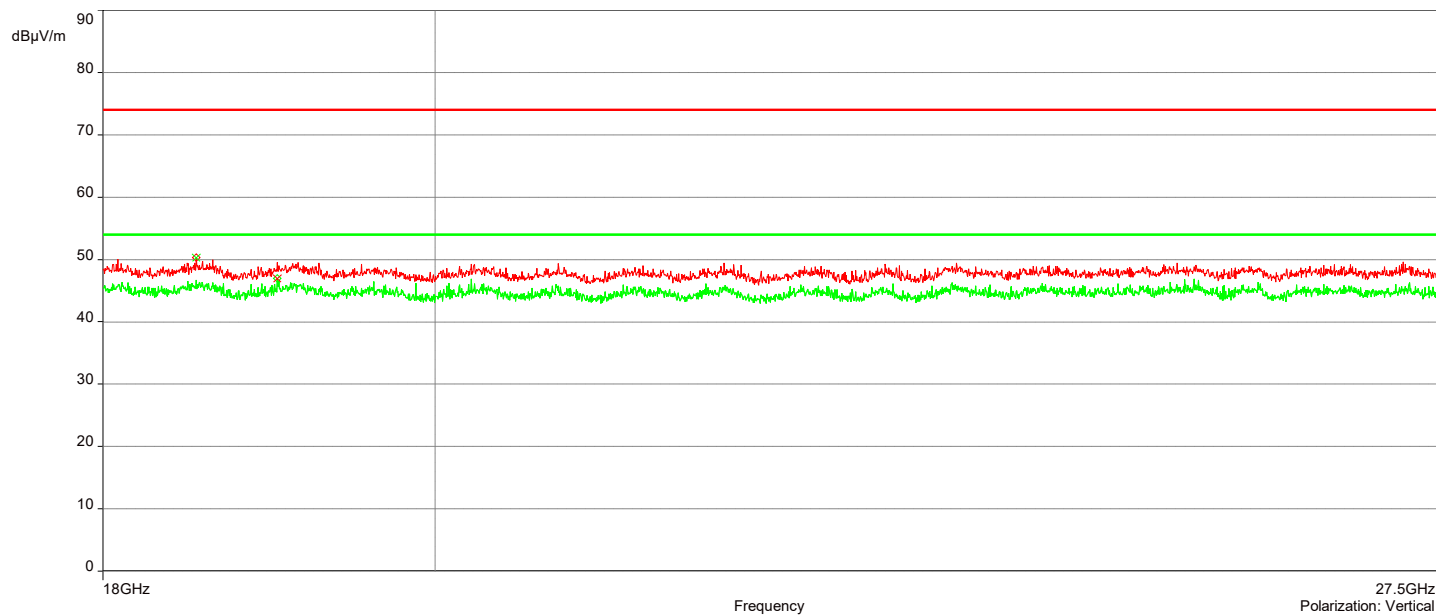
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No	Frequency (MHz)	Level Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	18.540577GHz	50.35	-0.24	74.00	-23.65	2.42	112.60	Vertical	Passed
2	18.652208GHz	50.10	-0.38	74.00	-23.90	3.57	112.60	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	19.021776GHz	46.98	-0.15	54.00	-7.02	2.54	112.60	Vertical	Passed
2	19.109655GHz	46.94	-0.23	54.00	-7.06	2.71	0	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBμV/m) = Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBμV/m) = Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

AH22021401-HAR-004#3_BT_Ch 39_18-27.5GHz

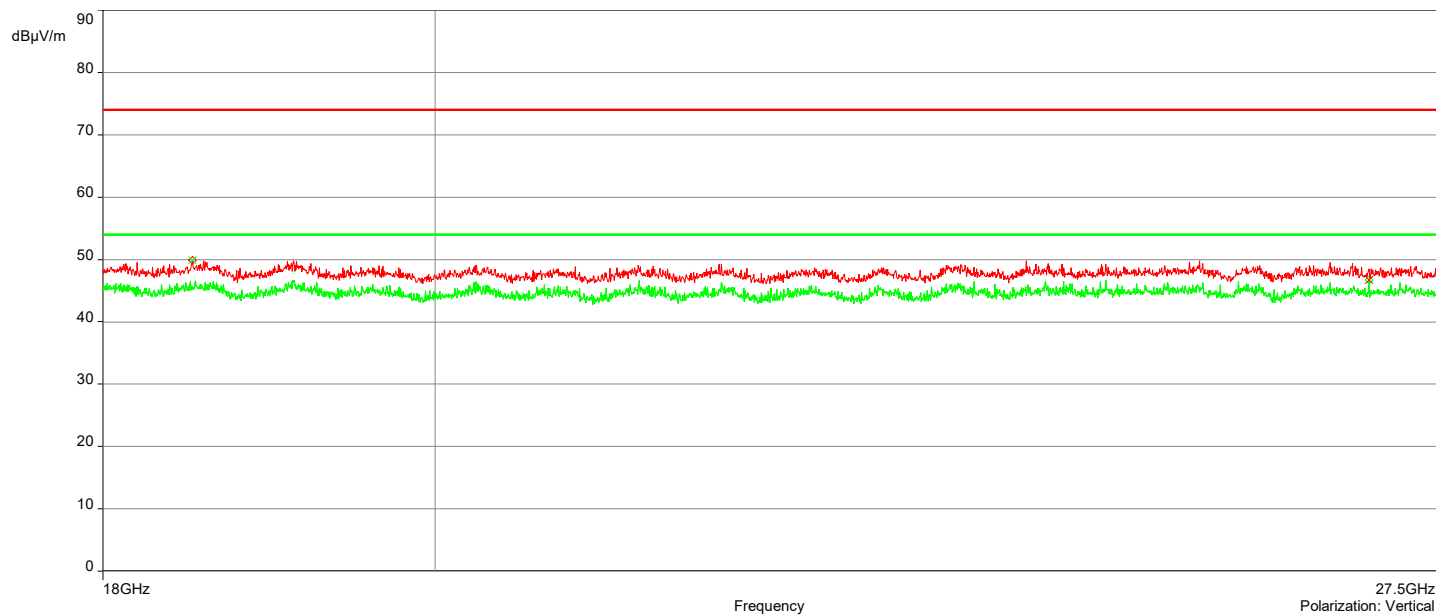
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No	Frequency (MHz)	Level Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	18.520151GHz	49.86	-0.25	74.00	-24.14	1.14	134.90	Vertical	Passed
2	19.157633GHz	49.93	-0.25	74.00	-24.07	3.97	224.90	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	26.895295GHz	46.72	4.76	54.00	-7.28	1.43	292.40	Vertical	Passed
2	18.126356GHz	47.32	-0.24	54.00	-6.68	2.76	314.90	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBµV/m) = Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBµV/m) = Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

AH22021401-HAR-004#3_BT_Ch 78_18-27.5GHz

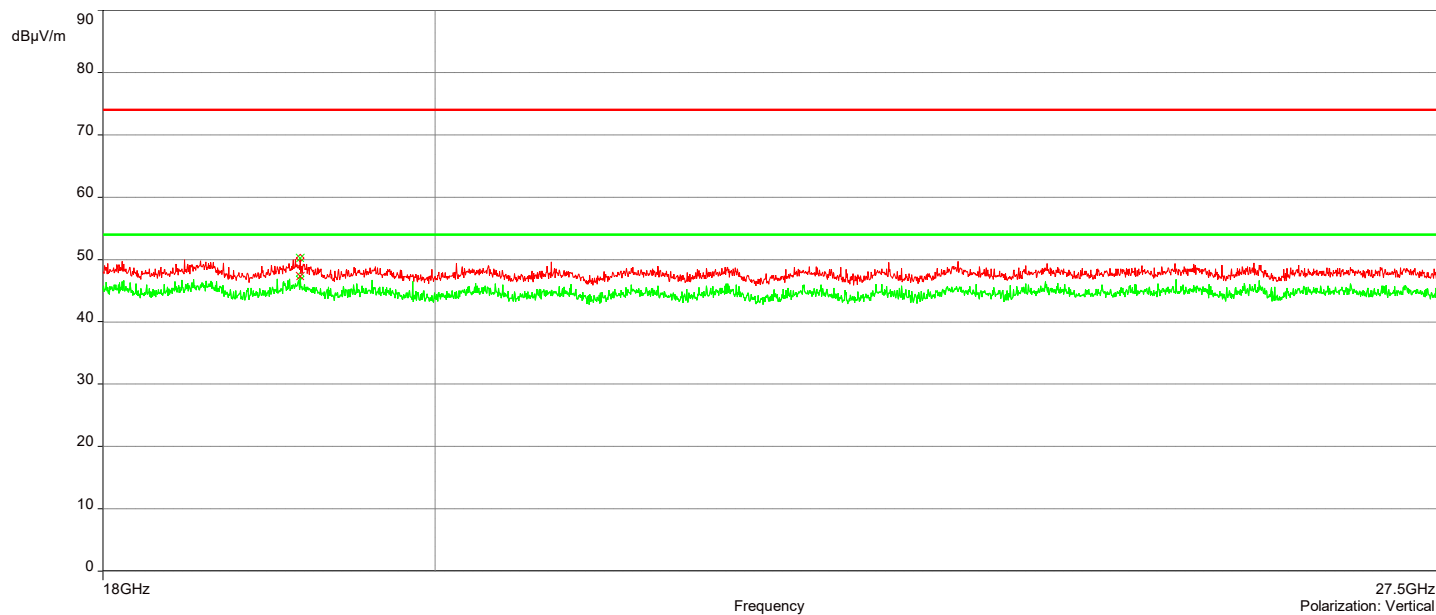
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No	Frequency (MHz)	Level Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	19.162858GHz	50.23	-0.18	74.00	-23.77	2.05	270.10	Vertical	Passed
2	25.037477GHz	49.89	2.53	74.00	-24.11	3.97	112.50	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	19.162858GHz	47.32	-0.18	54.00	-6.68	2.05	270.10	Vertical	Passed
2	18.506375GHz	47.44	-0.33	54.00	-6.56	2.04	337.40	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBμV/m) = Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBμV/m) = Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

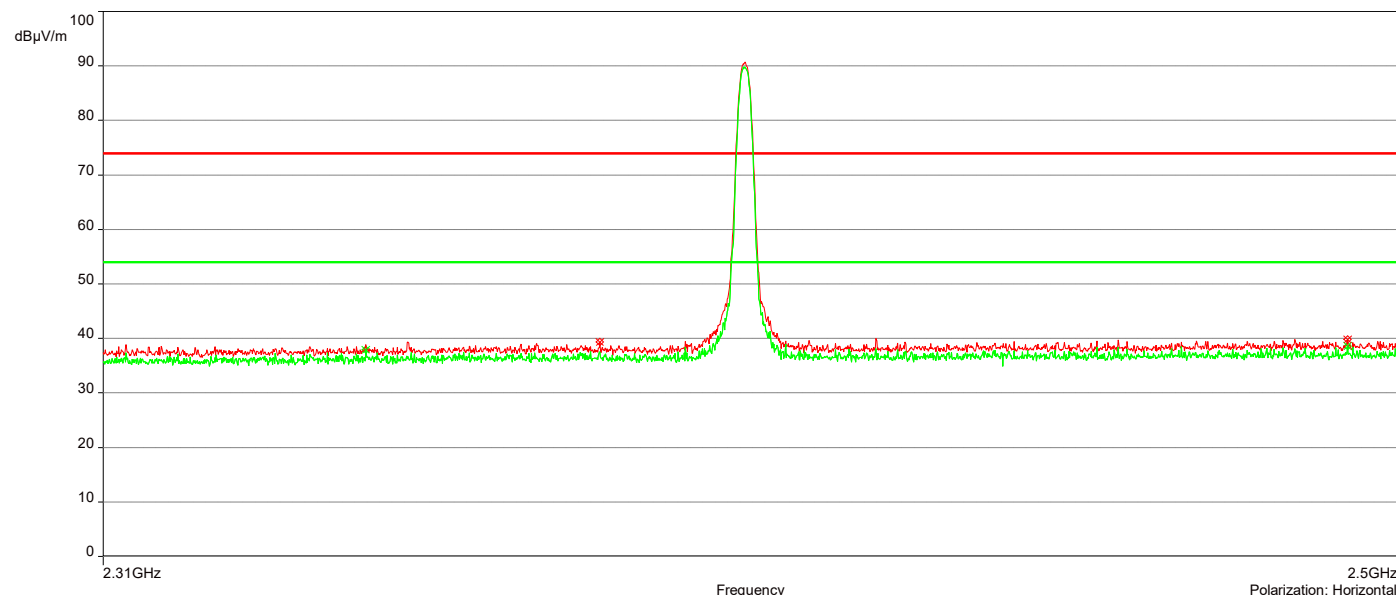
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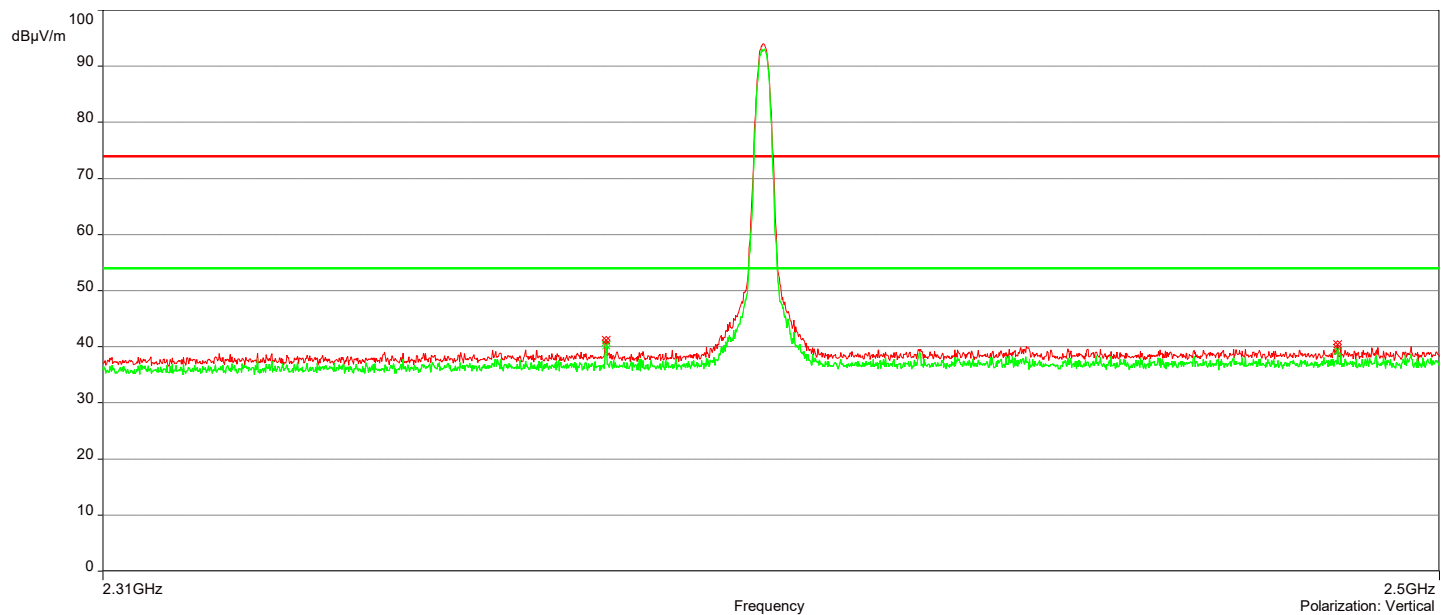
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No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.3797649GHz	41.20	-3.35	74.00	-32.80	1.37	89.90	Vertical	Passed
2.	2.4849825GHz	40.40	-2.91	74.00	-33.60	3.92	314.90	Vertical	Passed
3.	2.3809055GHz	39.39	-3.44	74.00	-34.61	3.90	292.40	Horizontal	Passed
4.	2.4918259GHz	39.88	-2.90	74.00	-34.12	2.64	224.90	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1.	2.3797649GHz	40.21	-3.35	54.00	-13.79	1.37	89.90	Vertical	Passed
2.	2.4849825GHz	39.23	-2.91	54.00	-14.77	3.92	314.90	Vertical	Passed
3.	2.3472586GHz	37.98	-3.58	54.00	-16.02	3.84	67.40	Horizontal	Passed
4.	2.4918259GHz	38.61	-2.90	54.00	-15.39	2.64	224.90	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBμV/m)= Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBμV/m)= Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

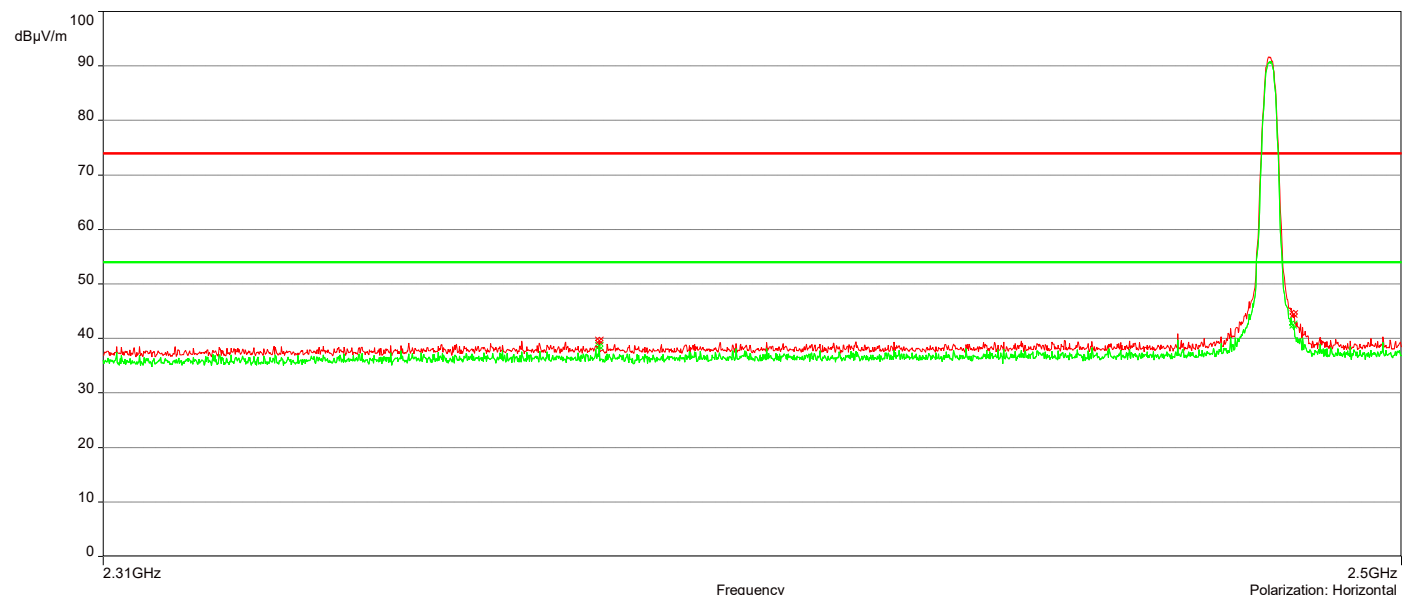
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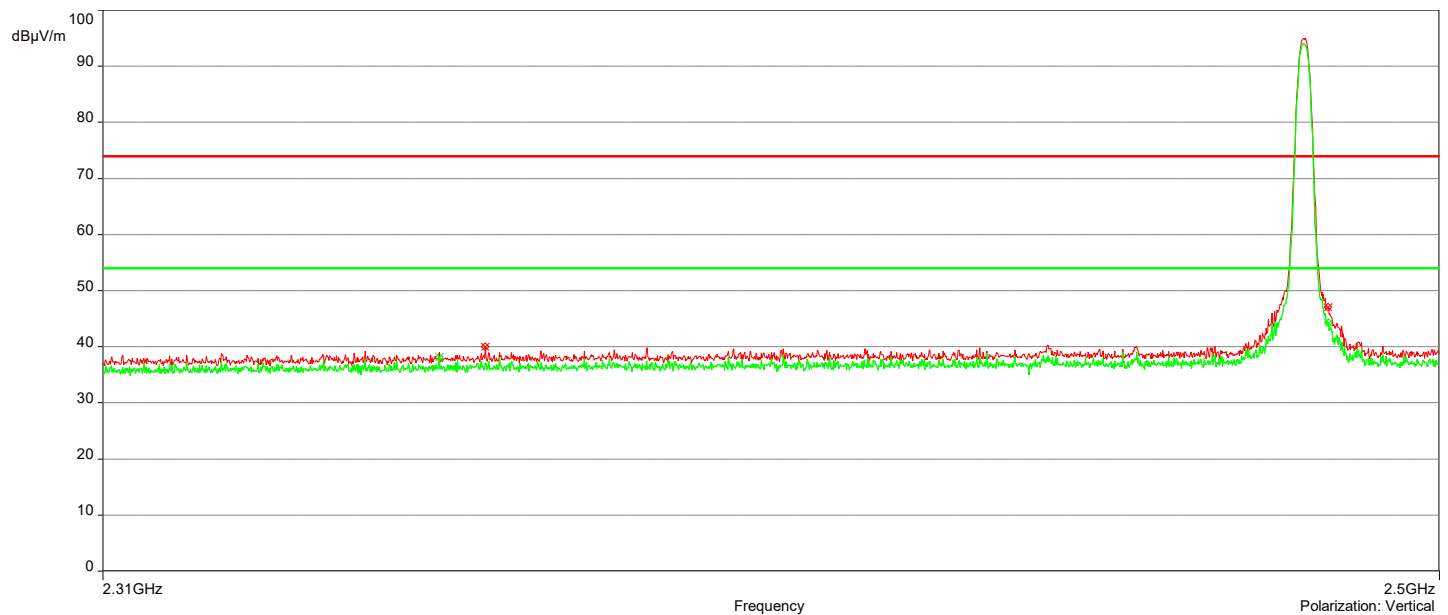
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No	Frequency (MHz)	Level Peak Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1	2.3628464GHz	39.98	-3.43	74.00	-34.02	3.61	44.00	Vertical	Passed
2	2.4835568GHz	47.09	-2.89	74.00	-26.91	1.47	89.20	Vertical	Passed
3	2.3808104GHz	39.65	-3.44	74.00	-34.35	2.01	179.20	Horizontal	Passed
4	2.4836518GHz	44.49	-2.91	74.00	-29.51	3.97	358.90	Horizontal	Passed

No	Frequency (MHz)	Level Average Reading (dBuV/m)	Correction Factor (dB)	Limit dBuV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgment
1	2.3563832GHz	38.16	-3.53	54.00	-15.84	1.15	21.60	Vertical	Passed
2	2.4836518GHz	44.29	-2.89	54.00	-9.71	1.00	156.50	Vertical	Passed
3	2.3808104GHz	38.60	-3.44	54.00	-15.40	2.01	179.20	Horizontal	Passed
4	2.4835568GHz	42.47	-2.91	54.00	-11.53	3.55	66.60	Horizontal	Passed

Overall Graphs:





Remarks:

- 1 Level Peak Reading (dBμV/m)= Raw Peak Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Peak Reading – Limit

Remarks:

- 1 Level Average Reading (dBμV/m)= Raw Average Level + Correction Factor
- 2 Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
- 3 Margin = Level Average Reading – Limit

Document Revisions

Version	Date	Modifier	Changes
1.0	04/11/2022	Aravind Buddana Ryan Philips	Initial Release
2.0	05/31/2022	Aravind Buddana	- Added FCC ID - Updated EUT Antenna Type Description. - Updated notes in test summary for performing full testing on 3-DH1 packet type. - Added Test data for Band edge DH1 packet type. - Added Time of channel occupancy for 3-DH5 packet type. - Added Tx spurious DH1 Test data.
3.0	06/03/2022	Aravind Buddana	Added DH1 BE LCH Hopping Mode plot

End of Report